Henrys Fork Salinity Control Project Plan

and

Final Environmental Impact Statement

IRRIGATION IMPROVEMENTS

United States
Department of Agriculture

Natural Resources Conservation Service

With Cooperating Agency Assistance From:

United States Army Corps of Engineers
United States Department of Interior
Bureau of Land Management
United States Department of Interior
Bureau of Reclamation
Wyoming Department of Agriculture
Wyoming Department of Environmental Quality
Wyoming Game and Fish Department
Wyoming State Historic Preservation Office
Utah State Historic Preservation Office
Sweetwater Conservation District
Daggett County Conservation District
Uinta County Conservation District

With Planning Assistance From:

United States Fish and Wildlife Service
United States Environmental Protection Agency
Utah Division of Wildlife
Wyoming State Engineers Office
Summit County Conservation District

Sweetwater and Uinta Counties, Wyoming

Daggett and Summit Counties, Utah

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Henrys Fork Salinity Control Project Plan

and

Final Environmental Impact Statement (FEIS)

IRRIGATION IMPROVEMENTS

Sweetwater and Uinta Counties, Wyoming

Daggett and Summit Counties, Utah

Lead Agency:

United States Department of Agriculture – Natural Resources Conservation Service (NRCS)

Responsible Federal Official (RFO):

Astrid Martinez

NRCS State Conservationist, Wyoming

Cooperating Agencies:

United States Army Corps of Engineers (USACE)

United States Department of Interior – Bureau of Land Management (BLM)

United States Department of Interior – Bureau of Reclamation (BOR)

Wyoming Department of Agriculture (WDA)

Wyoming Department of Environmental Quality (WyDEQ)

Wyoming Game and Fish Department (WGFD)

Wyoming State Historic Preservation Office (SHPO)

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United States Fish and Wildlife Service (USFWS)

United States Environmental Protection Agency (EPA)

Utah Division of Wildlife

Wyoming State Engineers Office (SEO)

Summit County Conservation District

We are not soliciting comments at this time. This release is intended to allow the public a period of review. Appendix A of the final EIS contains a summary of public comments received on the draft EIS, the Service's responses to substantive comments, and all the written comments received on the draft EIS.

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Table of Contents

List of Figures

List of Charts

List of Appendices

Summary of Plan and Final Environmental Impact Statement

Project Name: Henrys Fork Salinity Control Project / Irrigation Improvements

Counties and States: Sweetwater and Uinta Counties, Wyoming

Daggett and Summit Counties, Utah

Document Type: Plan and Final Environmental Impact Statement

Preface

All United States Department of Agriculture (USDA), Natural Resources Conservation Service (NRCS) programs are available on a strictly voluntary basis. Each landowner or individual water user group will decide whether to participate in this program. The intention of this plan is to evaluate the cost effectiveness and potential environmental impacts this project will have if Colorado River salinity control funds are made available to the landowners in the Henrys Fork Salinity Control Project. An evaluation was done to determine the cost effectiveness and overall salinity reduction benefits. No site-specific designs or environmental evaluations were completed for the individual irrigation delivery systems at this time. Designs and evaluations will be done on a case-by-case basis and will only be completed for the water users that are interested in participating.

Each individual project will have a site-specific environmental evaluation done to assess effects on soil, water, air, plants, animals, cultural resources, other aspects of the human environment, and wildlife habitat. All practices will be designed and installed to minimize negative impacts to cultural resources, known or discovered. All policies and procedures described in the Advisory Council on Historic Preservation, 36 CFR Part 800, Protection of Historic Properties, Final Rule; the Endangered Species Act; the Federal Water Pollution Control Act, also known as the Clean Water Act will be followed. Gains and losses in habitat quality created by project activities will be tracked with the goal of mitigating lost habitat values.

Statement of Need and Purposes for the Proposed Action

The Henrys Fork River is tributary to the Green River which is a primary tributary to the Colorado River. The Colorado River provides domestic and industrial water for some 35 million Americans and is used to irrigate approximately 4 million acres of land in the US. The river also provides irrigation, domestic, and industrial water to Mexico. Water deliveries from the U.S. to Mexico are governed by treaties between the two countries that prescribe amounts and quality of the water delivered.

The early 1970s saw significant concern by water users over the increasing salinity of the Colorado River. Annual damages from dissolved salts in the lower basin of the Colorado River have been quantified as high as $350 million. Not only were damages increasing from rising salt concentrations but the passage of the Clean Water Act foreshadowed pending regulation unless water quality could be maintained. The seven states developed a response to the CWA that provides numeric criteria for total dissolved salts (TDS), a plan of implementation of salt control measures, and a review of the standards every three years. The seven states who share Colorado River water as governed by the Colorado River Compact petitioned Congress resulting in enactment of the Salinity Control Act in 1974. The Act provides an authority to meet the needs of the states as well as meet the treaty obligations to Mexico.

Salinity control projects have been implemented throughout the Colorado River Basin by the actions of local, state, and federal partners. The USDA Natural Resources Conservation Service currently administers 11 projects in the three states of Colorado, Utah, and Wyoming. Through the combined actions of all the partners, the salt load of the Colorado River has now been reduced by about 1.2 million tons annually. In order to maintain the current water quality (with respect to salinity concentrations), prevent increased damages, and allow for full development of water resources under the Colorado River Compact an additional .5 to 1 million tons of salt control are needed by 2030. The Natural Resources Conservation Service has developed this plan and EIS to reduce 6,540 tons of annual salt loading to the Colorado River system by implementing conservation practices in the upper Henrys Fork project area.

The Henrys Fork area was not identified by name in Title II of the Colorado River Basin Salinity Control Act, but was identified by USDA as an area which should be studied for possible salinity control. The salt loads from the project area entering the Colorado River contribute to overall salinity concerns.

The combined Plan and Final Environmental Impact Statement has three major components: (1) to determine the contribution of the salt loading to the Colorado River from irrigated hay and pasture land; (2) to reduce salt loading through improvements in on-farm irrigation delivery and application systems; and (3) to determine environmental effects of the recommended plan, Alternative B – Irrigation System Improvements.

Recommended Plan

The recommended plan is to implement Alternative B – Irrigation System Improvements.

Through implementation of this alternative, on-farm irrigation application system improvements will occur at an accelerated rate as producers voluntarily sign-up for improved irrigation systems. It is estimated that through this alternative 70 percent of the irrigated acres in the project area will have improved irrigation systems. Most of the surface irrigation systems will be converted to side roll, center pivot, and pod sprinkler systems. The remaining 30 percent will remain as an unimproved irrigation system.

A limited amount of on-farm delivery ditches that transport irrigation water from the canal to the field will be improved by converting from dirt ditch to buried pipe. This will reduce seepage and salt loading from these delivery ditches by 99 percent. There are no canal modifications (i.e. conversion to pipeline or canal lining) included in this plan.

Currently, approximately 70,790 acre feet of water are used for irrigation in the project area. This includes water directly diverted from streams and water stored in reservoirs. The irrigation system improvements outlined in this plan will provide more efficient use of this water. Deep percolation from the 14,096 acres is expected to be treated though the project action, reducing it by approximately 40 percent. The Colorado River salt loading attributed to this project area will be reduced by the reduction of excess deep percolation passing below the plant root zone. Deep percolation of irrigation water results in concentrating and transporting salt in groundwater through the soil and eventually ending up in the Colorado River.

This proposal is not intended to bring new land under irrigation or to provide water to fields that have been infrequently or marginally irrigated. Any project measure proposed on lands without an adequate irrigation history will not be considered for funding without prior approval by the appropriate state water authority.

Existing financial and technical assistance programs will continue to operate as they have in the past. However, this recommended plan will increase the available federal funds for assistance. On-farm irrigation water management will expand due to an increase in technical assistance provided by the NRCS field office and through improved irrigation system capabilities.

The total direct cost of this alternative is estimated to be $24,851,431.

Alternatives Evaluation

1. What action is proposed?

- Action: The recommended action is to implement Alternative B – Irrigation System Improvements to reduce deep percolation of irrigation water, which dissolves salt and carries it into the Colorado River System.
- Extent: Deep percolation from 14,096 acres is expected to be treated through the project action, reducing it by approximately 40%.

2. Why?

- Action: To protect and enhance national economic development and to protect and enhance environmental quality. To achieve US/Mexico treaty water quality obligations.
- Extent: Estimated salt load reduction of 6,540 tons/year into the Colorado River System.

3. What other action(s) would meet the same need?

- Action: There are no known other alternatives that achieve the quantity of salt savings and the cost/ton salt saved in the project area that the recommended alternative provides.

4. What would it mean not to meet this need?

- Action: Downstream states and Mexico will continue to sustain damages to irrigation, industrial, and agriculture from dissolved solids (salt). US will not meet treaty obligations with Mexico for water quality delivered.
- Extent: Estimated project annual salt load reduction of 6,540 tons/year will continue to be deposited into the Colorado River System.

5. What are the effects of the recommended plan?

- Action: Reduced salt loading into the Colorado River System, improved hay and pasture yields, and improved income to producers.
- Extent: Estimated salt load reduction is 6,540 tons/year into the Colorado River System. Grass, hay, and aftermath grazing yields are anticipated to rise 119%. Irrigation-induced wetland acreage

is expected to decline by 800 acres. Wetland-dependent species are likely to decrease. Upland/forage-dependent species may increase.

6. What factors will be used when making the decision between the alternatives?

- Action: The following criteria will be used to evaluate the alternatives:
    - Consideration of comments received in the EIS process
    - Satisfaction of project purpose and objective
    - Technological feasibility
    - Relative costs
    - Environmental consequences
    - Logistics
- Extent: Two alternatives were studied in detail:
    - Alternative A: No-Action
    - Alternative B: Irrigation System Improvements

7. Are there any ways to mitigate adverse effects?

- Action: Habitat value compensation practices will include riparian habitat improvements through removal of invasive species, improved grazing and wildlife management, with facilitating practices, and wetland enhancements and creation.
- Extent: Approximately 129 acres of on-site wetland mitigation can be achieved under various practices.

8. What monitoring is necessary that is not included in the recommended alternative?

- Action: The Montana Wetland Assessment tool will assist in quantifying habitat replacements, but to fully understand the impacts would require thorough surveys of plant and animal species pre- and post-construction, which are not feasible given expense.

Introduction

Purpose and Objective

This project is designed to reduce salt loading contributions of the Upper Henrys Fork River to the Colorado River System from irrigated agriculture. The salt loading reduction will be achieved by on-farm irrigation system improvements and some on-farm water delivery ditches in the project area. The Colorado River Basin Salinity Control Act firmly establishes that the purpose of salinity control projects is to reduce the salt load carried by the Colorado River. Two national objectives form the basis for planning salinity control activities. These are to protect and enhance national economic development and to protect and enhance environmental quality. This project is formulated to achieve these objectives.

Scope of this Environmental Impact Statement

The existing program for funding on-farm Colorado River salinity control projects is the USDA Environmental Quality Incentives Program (EQIP). This program is covered by a programmatic environmental assessment. The conservation practices planned for this project are included in that programmatic assessment to address water quality improvement and water conservation. EQIP federal financial assistance is currently available in the Henrys Fork area for these various types of practices. Being designated as eligible for EQIP salinity funds would increase funding to assist additional agricultural producers at an accelerated rate. This combined Plan and Final Environmental Impact Statement (DEIS) is intended to evaluate effects more specific to this salinity project area.

This document provides a programmatic NEPA analysis of a suite of similar, spatially connected practices within the Henrys Fork Salinity Control Project Area. This “Area-Wide” level analysis provides an early identification of potential cumulative effects of the project in addition to monitoring and mitigation strategies. Subsequent Environmental Evaluations (EE) will be conducted on individual landowner practices through the planning process and as the specifics (location, scale, potential effects, etc.) are determined. Any individual landowner practices that have potentially significant adverse effects to the environment will be subject to NEPA EA or EIS level analysis.

Per NRCS regulations that implement NEPA at 7 CFR Part 650, site-specific Environmental Evaluations (EE) are developed as part of the conservation planning process. The EE evaluates conservation planning options developed to address and mitigate potential environmental resource concerns that may exist on the property or conservation management unit. The EE also determines if protected resources exist on the property and if those resources have the potential to be affected by conservation practices outlined in the conservation plan. The resources that are evaluated in the EE include, but are not limited to: wetlands; floodplains; sole source aquifers; threatened and endangered species and their critical habitat; cultural resources; coastal zones; riparian areas; scenic beauty; socioeconomic resources; and environmental justice issues. NRCS guidance on the site-specific environmental evaluation process and definitions of protected resources can be found in the NRCS "National Environmental Compliance Handbook" (USDA, 2006).

The scope of the project evaluation involved inventorying and analyzing current irrigation systems and management practices used in conjunction with these systems. These irrigation systems comprise approximately 20,709 acres within the 69,929 acre project area. Each of the systems will be analyzed separately to determine what type of improvements would be the most economically feasible and potential environmental effects. An analysis was done to determine the average cost effectiveness of the project. A survey indicated that approximately 14,096 acres could be treated under Alternative B (recommended plan) of this project. Landowner participation will be voluntary in all instances.

On-farm irrigation improvements evaluated included conversion to sprinkler systems or surface system improvements along with improvements to the on-farm delivery ditches. The delivery ditches carrying the water to individual fields will be improved where needed. There are no canal modifications (i.e. conversion to pipeline or canal lining) included in this plan.

Description of Plan Formulation

Salt loading to surrounding tributaries and eventually the Colorado River from irrigation sources in the valley is caused by seepage and deep percolation of irrigation water into, and through salt laden soils and shale layers. Practices that can reduce seepage, deep percolation, and the associated salt loading are summarized below:

- Ditch seepage will be reduced by replacing a limited amount of on-farm irrigation ditches with pipelines.
- Tailwater runoff and deep percolation will be addressed by replacing inefficient flood irrigation systems with sprinkler irrigation systems.

The undulating topography, ranging between 2 to 4 percent slopes, essentially precludes uniform application of irrigation water using surface application methods in much of the area. Without uniformity of application, a primary element of irrigation water management is lacking. Sprinkler irrigation systems are better suited to the uneven topography to achieve a more uniform distribution and other aspects of irrigation water management needed for salinity control. Pipelines carrying water will essentially eliminate seepage from a portion of the existing on-farm water delivery ditches and reduce losses to phreatophytes. Plan formulation focuses on delivery system improvements and on-farm application improvements. The on-farm irrigation system improvements will help to facilitate and enhance irrigation water management. Irrigation water management is a key non-structural component of salinity control.

Responsible Federal Official (RFO)

The Wyoming NRCS State Conservationist, Astrid Martinez, is the RFO.

Setting

Project Area

The Henrys Fork Watershed area encompasses about 306,098 acres, including portions of four counties in the northeastern corner of Utah and the southwestern corner of Wyoming. Irrigation systems within the watershed form a mosaic that covers approximately 20,709 acres. The Henrys Fork Salinity Control Project Area is a polygon encompassing these irrigated lands in addition to adjacent non-irrigated lands, which together comprise approximately 69,929 acres. (See Appendix B. Henrys Fork Salinity Control Project Area Map)

The only towns in the area are Manila, population 308 and McKinnon, population 51. Ranching and farming are the main enterprises. Oil and gas wells and underground gas storage operations are located in eastern Daggett County, Utah. Oil and gas wells have also been drilled in the western part of the area in Uinta County, Wyoming. The number of summer homes is increasing, mainly in the area west of Flaming Gorge, Utah.

Elevations in the project area range from 6,044 feet, to 8,795 feet

Water

The surface waters of the study area originate in the Uinta Mountains in the southwestern part of the basin and flow generally south to north to Henrys Fork then east through the study area and eventually discharge into Flaming Gorge Reservoir. Because precipitation in the study area is low, many streams are intermittent or ephemeral, with most flows resulting from local and regional snowmelt and rainfall runoff (Mason and Miller, 2004). Henrys Fork has the largest flow of any stream in the study area, and moderate to large flows are a result of runoff from snowmelt in mountainous areas in the northern and southwestern parts of the basin (Mason and Miller, 2004). Annual streamflow values are for the period of record (water years 1929–2009) at Henrys Fork near Manila, Utah.

The Henrys Fork is described as 2AB stream. Class 2AB waters are those known to support game fish populations or spawning and nursery areas at least seasonally and all their perennial tributaries and adjacent wetlands and where a game fishery and drinking water use is otherwise attainable.

Class 2AB waters include all permanent and seasonal game fisheries and can be either “cold water” or “warm water” depending upon the predominance of cold water or warm water species present. All Class 2AB waters are designated as cold water game fisheries unless identified as a warm water game fishery by a “ww” notation in the “Wyoming Surface Water Classification List.” Unless it is shown otherwise, these waters are presumed to have sufficient water quality and quantity to support drinking water supplies and are protected for that use. Class 2AB waters are also protected for nongame fisheries, fish consumption, and aquatic life other than fish, recreation, wildlife, industry, agriculture, and scenic value uses.

All irrigation water in the project area is supplied by surface water; no groundwater is used for irrigation. Irrigation systems in the project area consist of unimproved flood irrigation, gated pipe flood irrigation, and some sprinkler systems.

There are two reservoirs in the watershed area, Beaver Meadows Reservoir and Hoops Lake.

Geology

Henrys Fork lies within the Southwestern Wyoming Province. Within this province is the Greater Green River Basin (GGRB). The general geology for the GGRB is a large, complex intermontane area that covers much of southwestern Wyoming; it is used as a general term to include a number of separate structural arches and sedimentary basins as described below. Mountain ranges (uplifts) border the GGRB on all but the western edge, where the Thrust Belt borders it. The GGRB is bounded on the south by the

Uinta Mountains and Cherokee Ridge; on the southeast, east, and northeast by the Sierra Madre, Rawlins uplift, Granite Mountains, and Wind River Range; and on the north by the Gros Ventre Range.

Three major sedimentary basins are found with the GGRB – the Green River, Washakie, and Great Divide basins. The Green River Basin occupies the western half of the GGRB, and is separated from the Great Divide and Washakie basins in the east half of the GGRB by the north-trending Rock Springs uplift. The Wamsutter arch, an eastward extension of the Rock Springs uplift, is a structural divide that separates the Washakie Basin from the Great Divide Basin. The GGRB is part of the Wyoming Basins geomorphic province, topographic relief within the GGRB is much less than the surrounding mountains, with the lowest areas occupied by stream drainages and the higher areas by cuestas, mesas, and plateaus.

Bedrock along Henrys Fork is alluvium and colluvium. The alluvium and colluvium is identified as clay, silt, sand, and gravel in floodplains, fans, terraces, and slopes. To the north of the river is the Bridger formation which is identified as greenish-gray, olive-drab, and white tuffaceous sandstone and claystone; lenticular marlstone and conglomerate. Lithology: fine-grained mixed clastic; mixed clastic/volcanic; mixed clastic/carbonate.

The alkalinity in the Bridger formation comes from the tuffaceous claystone and marlstone. These are sodium carbonate composite sedimentary rocks. In a study of aquifer characterizations of the Bridger formation TDS concentrations varied and indicated that most waters were fresh (67% of samples) and remaining waters ranged from slightly to moderately saline (supplementary data tables). TDS concentrations ranged from 213 to 4,380 mg/L, with a median of 811 mg/L. Naftz (1996) mapped TDS concentrations in the Bridger aquifer (composed of the Bridger Formation) in the Green River Basin.

To the south of the river from Spring Creek to Beaver Creek the bedrock is identified as alluvium and colluvium, landslide deposits and glacial deposits. From Beaver Creek to Burnt Fork bedrock is identified as landslide deposits and undivided surface deposits. The undivided surface deposits is identified as mostly alluvium, colluvium, and glacial and landslide deposits. From Burnt Fork to Antelope Wash bedrock is the Bridger formation. However, there is a thin unit of Green River formation: Laney member that runs along the southern part of Henrys Fork and is identified as oil shale and marlstone. The lithology is oil shale; mixed clastic/carbonate.

The Bridger formation is reported to be approximately 400 feet thick with the Green River formation below it. The beds are dipping to the west-southwest along Henrys Fork.

However, the bulk of the irrigated land lays on the alluvium, colluvium, landslide deposits, and glacial deposits. These units are reported to have a depth ranging from 32 feet to 180 feet thick along Henrys Fork. Below these units lays the Bridger Formation which can act as an aquitard with the claystone and marlstone. The irrigation water is perched on top of the bedrock in the alluvium, colluvium, and landslide deposits and migrates down gradient to a discharge point, such as a spring or wet area.

During the irrigation season, the percolating water, sub-water from irrigation, migrates through the soil profile up-taking the salt ions from salt-bearing soils. This uptake of the salts increases the concentration in the infiltrating water and spreads it throughout the unsaturated zone. This salt is carried down to the shallow aquifer and then migrates down gradient to discharge points such as springs and the creeks that receive the shallow water thus releasing the salts to surface water systems such as Henrys Fork and ultimately the Colorado River System.

Soils

General Nature of the Survey Area

This section provides general information about the survey area. It was taken directly from the Henrys

Fork Soil Survey Publication. It describes history and development, natural resources and land use, geology, physiography and drainage, and climate.

Henrys Fork survey area encompasses about 240,000 acres, including portions of four counties in the northeastern corner of Utah and the southwestern corner of Wyoming (see maps in Appendix B). About 127,500 acres is in Daggett County, Utah; 26,000 acres is in Summit County, Utah; 49,000 acres is in Sweetwater County, Wyoming; and 37,500 acres is in Uinta County, Wyoming. Of the total acreage about 98,210 acres is private land, 36,080 acres is State land, and 105,710 acres is Federal land.

General Soil Map Units

The general soil map in Appendix B shows broad areas that have a distinctive pattern of soils, relief, and drainage. Each map unit on the general soil map is a unique natural landscape. Typically, a map unit consists of one or more major soils or miscellaneous areas and some minor soils or miscellaneous areas. It is named for the major soils or miscellaneous areas. The soils or miscellaneous areas making up one unit can occur in another but in a different pattern.

The general soil map can be used to compare the suitability of large areas for general land uses. Areas of suitable soils or miscellaneous areas can be identified on the map. Likewise, areas that are not suitable can be identified.

Because of its small scale, the map is not suitable for planning the management of a farm or field or for selecting a site for a road or building or other structure. The soils in any one map unit differ from place to place in slope, depth, drainage, and other characteristics that affect management.

The general map units in this survey have been grouped for broad interpretive purposes. Each of the broad groups and the map units in the project area are described in the following paragraphs.

Soils on Floodplains

This group consists of two map units Coweslglen-Spicerlon-Hagga and Turson-Menbar. It makes up about 7 percent of the Henrys Fork survey area. The topography is nearly level to gently sloping. Native vegetation is grasses, sedges, forbs, shrubs, and trees. Elevation is 6,000 to 8,400 feet. The average annual precipitation is 9 to 16 inches, the average annual air temperature is 38 to 45 degrees Fahrenheit, and the frost-free period is 50 to 90 days. The soils are very deep and well drained, moderately well drained, or poorly drained.

Soils on Alluvial Fans, Fan Piedmonts, and Terraces

This group consists of three map units, Luhon-Poposhia-Brownsto, Dahlquist-Harpole, and Strych-Gerst-Milok Shallow. They together make up about 36 percent of the survey area. The topography is nearly level to moderately steep. Native vegetation is shrubs, forbs, and grasses with some areas of juniper. Elevation is 5,400 to 8,800 feet. The average annual precipitation is 7 to 14 inches, the average annual air temperature is 40 to 48 degrees Fahrenheit, and the frost free period is 50 to 110 days.

Land Ownership

The Henrys Fork watershed area includes 306,098 acres and land ownership is categorized as private, state, and federal lands including United States Department of the Interior (USDOI) Bureau of Land Management (BLM) and U.S. Department of Agricultural (USDA) Forest Service (see chart below).

Chart 1. Project Area – Land Ownership.

Land Ownership		
Private		69,621 acres
State of Wyoming		16,750 acres
USDOI Bureau of Land Management		85,450 acres
USDA Forest Service		134,277 acres
	Total	306,098 acres

The project area lies within four counties and two states. The two states are Wyoming and Utah. The two counties in Wyoming are Sweetwater and Uinta and the two counties in Utah are Daggett and Summit counties.

The proposed treatment area is comprised of 20,709 acres which would be the targeted area for salinity control. The entire Henrys Fork watershed will not be a targeted salinity control area, only the 20,709 acres of privately owned irrigated land.

Cultural Resources

Cultural resources are the evidences of past human activities on the landscape. These can include historic buildings like barns or cabins, old trails or roads, prehistoric camp sites, rock inscriptions, prehistoric glyphs, or even old irrigations ditches.

Class I Inventory General Discussion

The Class I inventory consists of an archival and literature search within the Wyoming State Historic Preservation Office (SHPO) and Utah SHPO repositories. The archival and literature search was conducted during the spring of 2012. The Class I inventory denotes that only a small percentage of the project area has been surveyed for cultural resources. However, a wide variety of cultural resources are known to exist in the project area. These include, but are not limited to, archaeological sites, the location of the first Rocky Mountain fur trade rendezvous, and sites (including historic buildings and irrigation ditches) related to the historic period.

Culture History Overview

The Henrys Fork salinity area has potentially seen human occupation for approximately 12,000 years. Through Gearge Frison’s work on the Northwestern Plains Tradition is favored here, pertinent information from northern Colorado archaeological traditions (Reed and Metcalf 1999) and Great Basin archaeological traditions (Jennings and Norbeck 1955 and Simms 2008) may also prove valuable in understanding the Prehistory of the Henrys Fork salinity area. The following overview presents the Northwestern Plains chronology as detailed by Frison (1991). It should be noted that the project area is located at the intersection of at least three cultural traditions, each of which provides its own temporal variation and associated material culture.

In general, the last 12,000 years are divided into two major categories, Prehistoric and Historic. The Prehistoric period includes the Paleoindian, Archaic, and Prehistoric sub-divisions while the Historic period is generally divided into Protohistoric and Early Historic sub-divisions. The overview provided here does not provide an in-depth discussion on the Prehistoric or Historic periods as that is simply beyond the scope of this project, rather it provides a general discussion.

Prehistoric Period – Paleoindian (ca. 11,500 to 7,500 years before present)

The Paleoindian period spans a time from the last glaciation at the end of the Pleistocene to the introduction of atlatl hunting technology in the early Holocene. Paleoindian culture is generally considered to consist of specialized Hunter-Gathers who focused on hunting Pleistocene megafauna (mammoth, extinct bison species, etc.). The spear is considered to be the primary hunting weapon for the highly mobile, nomadic, Paleoindian peoples. Projectile points provide the best diagnostic artifact class for this period. The most distinctive are large leaf-shaped and spear points. The earliest part of the period is recognized by the distinctive Clovis and Folsom points, which have a central flute or channel flake scar that runs up from a concave base. Additional projectile point styles include Goshen, Agate Basin, Hell Gap, Alberta, and Cody Complex points such as Eden and Scottsbluff. Additionally, Mountain and Foothill traditions would include Lovell Constricted and Pryor Stemmed points in the Paleoindian tradition but may represent a transition period between spear heads and atlatl darts.

Prehistoric Period – Archaic (ca. 7,500 to 1,500 years before present)

The Archaic period is typified by the transition from post-glacial environs to a warmer climate and the extinction of Pleistocene megafauna. Due to the more diverse resources of the mountain foothill areas and because the remaining populations of large ice-age mammals had become extinct, the Archaic immigrants hunted a wider array of animals than their Paleoindian ancestors. Archaic peoples also relied more upon plant foods as indicated by increased numbers of tools and features associated with the processing of plant foods (e.g. basin-shaped milling stones). A technological transition was also occurring with the introduction of the atlatl. Archaic period peoples seem to have adjusted their migratory patterns with the change in climate. Longer term camps that include semi-subterranean lodges, or pit houses, are prevalent in western Wyoming during this time period. Diagnostic artifacts from the Archaic include Hawken, Oxbow, Mallory, and McKean Complex projectile points.

Prehistoric Period – Prehistoric (1,500 to 350 years before present)

Cultural groups during this period continued to pursue an increasingly mobile way of life in order to exploit a large variety of seasonally available game and plant resources. The late Prehistoric period is marked with the introduction of bow and arrow technology as game was pursued with this technology in addition the dog was an important lightweight beast of burden and hunting assistant. Foraging life ways continue, but with more emphasis on mass kills (such as antelope traps and bison pounds/jumps) and reduced use of pit houses in favor of above ground shelters. These shelters, be they tepees or other forms of lodging, are represented on the landscape by the many stone circle sites that have been identified across the west. Diagnostic artifacts include Avonlea, Plains Side-Notched, and Prairie Side-Notched.

Historic Period – Protohistoric (350 to 200 years before present)

Protohistoric refers to the time period immediately before written history. The period began in Wyoming when Plains and Great Basin Indian groups began using the horse, followed by the use of Euro-American goods, notably firearms, trade beads, and metal implements, which were fashioned into knives and other practical tools. Extensive trade networks brought these items out onto the Northern Plains/ Intermountain West and with them came changes to Native people's culture. Specialized bison hunting typifies plains tribes during this period while intermountain tribes continued a generalized, though highly mobile, foraging pattern with the addition of the horse. The horse, in particular, created a profound change or "cultural revolution" on the Plains. The horse enabled people on the Plains to be extremely mobile and highly efficient hunters, especially in regard to bison hunting. Among other effects, this increased mobility led to intensified territorial disputes with neighboring tribes, resulting in shifting tribal boundaries. Federally recognized Indian tribes whose ancestors inhabited are the Northern Arapaho, Shoshone, Shoshone-Bannock, the Confederated Tribes of the Goshute, and the Ute. Metal and glass projectile points, Trade Beads, as well as firearm projectiles and casings provide the primary diagnostic artifacts.

Historic Period Overview

The Early Historic period includes the arrival of Europeans on the western landscape with the fur trappers and traders. In fact, the first of the Rocky Mountain fur trade rendezvous was held within the proposed project area boundary at the confluence of Burnt Creek and Henrys Fork in 1825. As the fur trade waned after 1840, homesteaders and pioneers moved into the area having made their way west to Ft. Bridger located along the Emigrant Trail northwest of the Henrys Fork salinity area. Irrigation in the valley dates back to at least the 1880s and much of the landscape was given over to farming related activities. This tradition of farming irrigated lands continues today and many of the original ditches, though modified through time and maintenance, are still in use.

Cultural Resources Consultation

Advisory Council on Historic Preservation (ACHP)

The USDA-NRCS has consulted with the Advisory Council for Historic Preservation and they concur with the approach to follow the existing State Level Agreements between the WY and UT SHPOs. In addition, they have reserved the right to be a consulting party. The concurrence letter from the ACHP is included with this document in Appendix C (Supporting Documentation).

State Historic Preservation Office (SHPO) Consultation

The USDA-NRCS has consulted with the Wyoming State Historic Preservation Office and the Utah State Historic Preservation Office regarding potential effects to cultural resources from the recommended plan and alternatives. All activities related to the recommended plan and alternatives are subject to Section 106 review. Section 106 review refers to Section 106 of the National Historic Preservation Act (NHPA) which requires federal agencies to take into account the effects of their actions on historic properties (NHPA of 1966 as amended). Specific concerns to cultural resources that result from the Henrys Fork Salinity project will be addressed on a project-by-project basis during Section 106 review. Consultation letters from the Wyoming and Utah SHPOs are included with this document in Appendix C (Supporting Documentation).

Tribal

The USDA-NRCS has consulted with the Northern Arapaho Tribe, Eastern Shoshone Tribe, Northern Ute Tribe, and the Shoshone-Bannock Tribes. To date, the Tribes have not provided a response or expressed an interest in the consultation process.

Certified Local Governments (CLGs) and Special Interest Groups

The USDA-NRCS has consulted with the Sweetwater Certified Local Government and the Summit County Certified Local Government; neither has expressed an interest in the consultation process. Correspondence is located in Appendix C (Supporting Documentation).

Social and Economic Characteristics

Based on U.S. Census Bureau data, the estimated 2009 population of Sweetwater and Uinta Counties, Wyoming is 41,226 and 20,927 respectively. In Sweetwater County, the population is 5.5 percent Non-white and 94.5 percent of the population White with Uinta County having 3.2 percent Non-white and 96.8 percent White. In comparison the state of Wyoming has a population of 6.5 percent Non-white and 93.5 percent White. The population of Daggett and Summit Counties, Utah is 941 and 36,969 respectively. In Daggett County, the population is 3.4 percent Non-white and 96.6 percent of the population White with Summit County having 3.6 percent Non-white and 96.4 percent White. In comparison the state of Utah has a population of 7.3 percent Non-white and 92.7 percent White.

Sweetwater and Uinta Counties, Wyoming each have a labor force population of 24,196 and 11,057 respectively with 23,608 employed in Sweetwater County and 10,712 employed in Uinta County. The respective rates of unemployment are 2.4 percent and 3.1 percent.

The top six employment sectors in Sweetwater County and the corresponding percent of the workforce are: mining (20 percent), government (14 percent), transportation/warehousing (10 percent), construction (9 percent), hotel/food services (8 percent) and information services (6 percent). By contrast, farm and ranch employment was 1 percent of the workforce. (Source: U.S. Census Bureau).

The top six employment sectors in Uinta County and the corresponding percent of the workforce are: government (17 percent), transportation/warehousing (13 percent), construction (11 percent), health care/social assistance (10 percent), mining (7 percent) and accommodation/food services (7 percent). Farm and ranch employment was 3 percent of the workforce. (Source: U.S. Census Bureau).

The major employers in Daggett County are: Collett's Recreation Services, Daggett County, Jacob Fields Service N.A., Daggett County School District, U.S. DOI Bureau of Reclamation (BOR), U.S. Forest Service, and the State of Utah. (Source: Utah Department of Workforce Services).

The major employers in Summit County are: The Canyons Resort, Deer Valley Resort, Park City School District, Park City Mountain Resort, Park City, Premier Resorts of Utah, Inc., Stein Eriksen Lodge, Summit County, and Pivotal Promontory Development. (Source: Utah Department of Workforce Services).

As of November 2008, the unemployment rate of Daggett and Summit Counties are 2.7 percent and 3.6 percent respectively. (Source: Utah Department of Workforce Services).

Chart 2. Socioeconomic Information – Sweetwater and Uinta Counties, Wyoming.

	Sweetwater County	Uinta County	Wyoming
Income			
Per Capita Income (1999)	$19,575	$16,994	$19,134
Median Household Income (2008)	$70,964	$62,253	$37,892
Unemployment (2008)	2.4%	3.1%	3.2
Persons below Poverty Rate (%, 2008)	5.8%	12.1%	9.8%
Median Single-family Home Value (2000)	$104,200	$89,400	$96,600
Education (2000)			
High School graduates	87.4 %	84.8 %	87.9%
Bachelor’s Degree or Higher	17 %	15 %	21.9%
Population (2009 estimate)	41,226	20,927	544,270
White persons not Hispanic	82.3%	88.7%	86.2%
American Indian or Alaska Native	1.3%	1.2 %	2.6%
Asian	0.8 %	0.4 %	0.8 %
Black or African American	1.5 %	0.3%	1.4 %
Native Hawaiian & Other Pacific Islander	0.0%	0.1%	0.1%
Hispanic or Latino	13.0%	8.5 %	8.1%
Two or more races	1.8 %	1.2 %	1.5 %
Persons 65 years and over	8.3%	8.2%	12.3 %

Source: U.S. Census Bureau

Chart 3. Socioeconomic Information – Daggett and Summit Counties, Utah.

	Daggett County	Summit County	Utah
Income			
Per Capita Income (1999)	$15,511	$33,767	$18,185
Median Household Income (2008)	$44,963	$79,698	$56,820
Unemployment (2009)	5.3%	6.4%	6.6%
Person below Poverty Rate (%, 2008)	7.9%	5.4%	9.7%
Median Single-family Home Value (2000)	$76,400	$296,000	$146,100
Education (2000)			
High School graduates	83.7%	92.5%	87.7%
Bachelor's Degree or Higher	11.9%	46.5%	26.1%
Population (2009 estimate)	941	36,969	2,784,57281.2%
White persons not Hispanic	92.3%	84.1%	1.4%
American Indian or Alaska Native	1.0%	0.4%	2.1%
Asian	0.1%	1.5%	1.4%
Black or African American	1.1%	0.6%	0.8%
Native Hawaiian & Other Pacific Islander	0.1%	0%	12.3%%
Hispanic or Latino	5.1%	12.6%	1.7%%
Two or more races	1.2%	1.0%	

Source: U.S. Census Bureau

Economic Analysis of Henrys Fork Salinity Control Alternatives

The analysis of Henrys Fork economics considers both a "no-action" alternative A and an alternative B that proposes irrigation efficiency improvements on 14,096 acres. The determination of total project and private landowner net present value is influenced by the costs of improvements, types of new irrigation practices and which practices are installed in the project area. Wheel lines, pivots, pod lines and gated pipe all have different up-front practice costs and annual operation costs for landowners. Installation costs are taken from the 2012 NRCS Practice Payment Schedule for Wyoming.

Operation costs are measured in terms of hourly labor; all-terrain vehicle (ATV) gas and maintenance, electricity, and pumping costs. Annual operating costs per acre are assumed to change when flood irrigation is replaced with any net benefits accruing to landowners. Since most systems will be designed to run on gravity flow water pressure, it is assumed that only 10 percent of treated acres will have pumping costs when flood irrigation is replaced. However, center pivot tower drive wheels will have electric costs.

Public benefits from irrigation improvements include the reduction in salt damage for downstream water users. These water quality improvements have been quantified and associated with projects already implemented in the Colorado River Basin (U.S. DOI, 2011). Additional benefits accrue to landowners when fields are not overwatered and hay is grown with more efficient water application methods. On similar salinity reduction projects, grass hay yields were projected to increase and higher quality forage is anticipated.

Due to the large project area, it will take 20 years to fully treat all acres. All improvements have a 15-year practice life. The result is that early period improvements will likely be at the end of their useful life before all acres are treated. This economic analysis does not consider the costs and benefits of replacement systems during the 35 year project period. Hay value and the cost of irrigation systems are assumed to increase at a 3 percent inflation rate during the project. Salt benefits are not subject to annual inflation in this analysis, since there is no evidence that these benefits will appreciate or depreciate over time. Costs and benefits accruing in future years were adjusted to net present value (NPV) using a discount rate of 4 percent in order to account for risk and the time-value of money. Future benefits and costs are reduced when converted to a NPV.

The cash flow of individual landowners is affected by up-front irrigation equipment costs, more efficient irrigation operations and improved hay production. The simple cash flow analysis in this EIS analyzes the hay enterprise on treated acres only. In general, cash flow is influenced by the need to use cash savings or an operating loan in order to achieve higher income later in the period.

From a property tax perspective, Sweetwater County’s average tax rate is 7.0555 percent. In Uinta County the average property tax rate is 6.5130 percent. The State of Wyoming assesses agricultural lands at 9.5 percent of agricultural value, residential and commercial at 9.5 percent and industrial at 11.5 percent of fair market value.

Recreational Resources

The four-county project area in southwest Wyoming and northeastern Utah offers limited outdoor recreational opportunities in a predominately rural but scenic area. Since the vast majority of the area is privately owned lands, recreation is predominately restricted to local residents, friends, and family. Recreation in the area includes fishing, hunting, hiking, and bird watching.

Aesthetic Resources

The aesthetic resource of the project area is a pastoral setting of woody riparian areas along the Henrys Fork River with intermittent hay fields and pastures. Henrys Fork is a clear running stream with a cobble/gravel streambed.

Air Quality

Air quality in the project area is generally in the range of "good to very good" quality (personal communications with DEQ Air Quality staff) given the lack of air quality compromising infrastructure in or within reasonable proximity of the project area.

Vehicle emissions from the Salt Lake area, and emissions from a variety of sources in the Evanston to Rock Springs corridor (north and northwest of the project area) and oil/gas operations primarily in Sublette County are far enough away – with adequate wind dispersal - to maintain the aforementioned relatively good air quality in the project area.

Wildlife Resources

A multitude of fish and wildlife species utilize the diverse habitats in the project area to meet seasonal or yearlong needs. Habitat types in the project area consist of perennial streams and rivers, riparian areas, and wetlands interspersed within irrigated meadows and surrounded by native sagebrush rangeland. The habitats likely to be directly impacted by this project are the irrigation-induced wetlands, wet meadows, and riparian-like habitats fed by and along on-farm irrigation canals.

The vast array of species found in the project area are comprised of many different types of big game, small game, carnivores, small mammals (including bats), birds (including waterfowl and shorebirds), reptiles, amphibians, fish, mollusks, and insects.

The Colorado River Basin Salinity Control Act (43 U.S.C. 1571-1599) authorized the Salinity Control Program and directed the Secretary of Interior to replace incidental fish and wildlife values foregone as a result of implementation of salinity control projects. The Secretary of Agriculture, through the same authorities, as amended and clarified in PL98-569, and through Executive Order 11990, Protection of Wetlands, is also directed to provide for replacement of incidental fish and wildlife values foregone by providing incentives and technical assistance for voluntary actions by landowners eligible for Department of Agriculture programs.

Impacts to wildlife resources and wetlands will be minimized using the following protocol:

(i) Avoidance: Project planners will ensure that all opportunities to avoid impacts are recognized and incorporated in the plan to the extent possible.

(ii) Minimization: Project planners will ensure that all opportunities to minimize unavoidable impacts are recognized and incorporated into the plan to the extent possible.

(iii) Compensation: Project planners will evaluate and quantify remaining unavoidable project impacts and identify appropriate measures to compensate for these impacts. Replacement of incidental fish and wildlife values foregone is synonymous with compensation for unavoidable impacts.

Wetlands

The USDA, National Food Security Act Manual defines wetlands as lands that have all of the following characteristics:

(i) A predominance of hydric soils.

(ii) Are inundated or saturated by surface water or groundwater at a frequency and duration sufficient to support a prevalence of hydrophytic vegetation typically adapted for life in saturated soil conditions.

(iii) Under normal circumstances support a prevalence of hydrophytic vegetation.

Lacking field by field on-site wetland determinations, wetland acreages have been estimated based on U.S. Fish and Wildlife Service National Wetland Inventory (NWI) data, NRCS Soil Survey information, and analysis of historical photography. In addition, during the summer and fall of 2010, several representative sites were examined in the field to verify the presence of hydric soils, wetland hydrology, and hydrophytic plants.

Estimates from the NWI data are approximately 15,000 of the 20,709 irrigated acres in the project area are wetlands. The wetland types are primarily Palustrine Emergent Seasonally Flooded (PEMC), Palustrine Emergent Temporarily Flooded (PEMA), Palustrine Forested Temporarily Flooded (PFOA), Palustrine Scrub Shrub Seasonally Flooded (PSSC), and Palustrine Scrub Shrub Temporarily Flooded (PSSA). NWI identifies wetlands primarily on the basis of vegetation and surface water characteristics without regard for the presence or absence of hydric soils.

Many perennial streams and rivers run through the project area and their floodplains and adjacent upland areas are irrigated from upstream diversions and ditches. Interspersed throughout the project area and within many of the irrigated fields are naturally occurring fens that are slope wetlands fed by groundwater originating from the north slope of the Uinta Mountains. This mix of natural and artificially created wetlands from irrigation is extremely complex to discern in the project area.

The NRCS Soil Survey of Henrys Fork Area, Utah-Wyoming – Parts of Daggett and Summit Counties, Utah and Sweetwater and Uinta Counties, Wyoming identified 8,433 of the 20,709 irrigated acres within the project area as potentially hydric soil.

At least 7,000 acres of the 20,709-acre irrigated area in the project are both potentially hydric and identified as wetland in NWI.

Because these sources of information suggested a large extent of potential wetland in the project area, a brief (7 day) field investigation was conducted in early June, 2010 by an interdisciplinary team which included soils and vegetation specialists, many of whom are trained in identification of wetlands according to the Corps of Engineers Wetland Delineation Manual (USACE 1987). The field investigation evaluated the three required components to meet wetland criteria: wetland hydrology, hydric soil, and prevalence of wetland/hydrophytic vegetation. Once in the field it was estimated a majority of the project area's irrigated lands have wetland hydrology and a prevalence of hydrophytic vegetation criteria. For much of the growing season the fields are flood irrigated and many of the plants found there are sedges, rushes, and willows. Meeting hydric soil criteria is the most limiting of the three factors in the project area and the definitive answer in determining what is and is not a wetland according to the manual.

A subsequent review of the project area was conducted by a soil scientist and wetland hydrologist. The purpose of this second field review was to determine if extensive areas of wetlands possessing organic soil horizons were natural wetland or only wet due to long term over irrigation. The reviewers determined that those wetlands with histic epipedons (organic soil profiles) are natural wetlands commonly known as fens. They further determined that wet areas without histic epipedons were wetlands only due to the influence of irrigation.

After the field investigations, estimates of the extent of wetland in the project area were refined by extrapolating wetland estimates from the percentages of hydric and non-hydric inclusions of mapped soil complexes. This analysis yielded an estimate of 5,631 acres of the 20,709 irrigated acres in the project area to be wetland.

Further extrapolation of the published soil survey data was conducted to estimate potential artificial wetlands from naturally occurring wetlands. Using the 5,631 acres of estimated wetland from the soil survey and field verification, the estimated acreage of natural wetland was reduced by 2,899 acres. These acres have soil qualities that may preclude them from maintaining the necessary hydrology to meet wetland criteria if supplemental water from direct irrigation or seepage from canals is eliminated. The remaining 2,732 acres are described as being associated with a "Peat" or "Riverwash" description. Of the estimated 2,732 acres of natural wetlands, approximately 500 acres are described as Riverwash. Such soils are located near active stream channels. Neither of the categories of natural wetlands are likely to be impacted by this project due to agency policy restricting such activity and lack of agronomic viability. Project specific wetland determinations and delineations will be conducted on each field with planned irrigation improvements to make a more accurate estimate of natural and artificial wetlands and assist in planning for mitigation efforts.

Chart 4. Henrys Fork – Estimated Wetland Acreage.

	Acres (number)
Peat or Fen Wetlands - Natural	2,232
Wetlands on Riverwash - Natural	500
Upland mineral soil Wetlands – Artificial (irrigation-induced)	2,899
Artificial and Natural Wetland – Total	5,631

Problems and Needs

Over time, salinity becomes a major problem in many irrigated areas. Areas with high saline soils, such as are common in southwestern Wyoming, have affected water quality since irrigation was first introduced, because of the irrigated land and the diffused source areas which contain natural deposits of salts. Salinity concentrations in the Colorado River adversely affect downstream irrigated crop production and other water uses. The problem is especially severe for water delivered to California, Arizona, and the Republic of Mexico.

Both natural runoff and irrigation contribute to the problem, either by concentrating salts or by salt loading. Salt concentration is caused by removal of water from the river system through consumptive use by irrigated crops and other vegetation, and by evaporation; unused minerals are concentrated in the water that remains. Salt loading occurs as groundwater dissolves subsurface minerals while flowing through the salt-laden soils and shale layers. Although both processes of salt concentration and salt loading occur, salt loading is the major cause of the salinity increase.

Salt loading from irrigation is related to subsurface return flows. The irrigation water applied is generally of good quality, although in most cases the quantity of water applied exceeds the crop needs. Deep percolation of excess irrigation water results in substantial return flows through soil and rock layers that contain the crystalline salt. The concentrations of dissolved salts (solids) transferred to the percolating water degrades the quality of water delivered through the Henrys Fork Area to the Green River and subsequently to the Colorado River.

Project Salt Loading

Of the average 37,200 tons of salt the Henrys Fork delivers annually to the Colorado River system, approximately 20,800 tons per year comes from irrigation activities associated with the proposed Henrys Fork area. The remaining 16,400 tons per year represents the salt produced from other sources.

Purpose of Project Salt Loading

The purposes of this hydrosalinity analysis are to:

(i) Estimate the probable agricultural salt load into the Colorado River System

(ii) Allocate pre-project salt loading to on-farm and off-farm sources

United States Geological Survey (USGS) Study

In 2009, the U.S. Geological Survey (USGS) was contracted to study salt loading in the Upper Henrys Fork area of Wyoming and Utah and prepared the Scientific Investigations Report, *"Dissolved-Solids Loads in Henrys Fork Upstream from the Confluence with Antelope Wash, Wyoming, Water Years 1970–2009."* From Table 3, Predicted and adjusted dissolved-solids load from SPARROW model for selected locations in the Henrys Fork Basin, Wyoming, water year 1991, in the USGS report, the adjusted mean annual dissolved solids load of 37,200 tons (±2,800 tons) was used as the basis for the local salt budget. In the "Distribution of Dissolved-Solids Load by Source at Selected Locations in Henrys Fork Basin" section of the report it states that approximately 56 percent of the dissolved-solids load at Henrys Fork upstream from Antelope Wash is associated with the 21,500 acres of irrigated land (total project area acreage has been refined to 20,709 acres since this study was completed).

Local Water/Salt Budget

A local water/salt budget was developed using an iterative calculation process based on estimated irrigation efficiencies of the existing irrigation systems, an annual composite crop consumptive use value, and an estimated irrigation season factor. The estimated irrigation efficiencies were based on experience from similar salinity projects in the region. The irrigation season factor accounts for the fact that historically irrigation water is not available for the entire irrigation season. The annual salt load of 20,800 tons which is approximately 56 percent of the adjusted mean annual dissolved-solids load of 37,200 ton as estimated in the USGS report was used as the salt budget endpoint. The results of the water/salt budget are shown in Chart 5

Assumptions used in Salt Budget include:

(i) Total agricultural salt load, on-farm and off-farm, is 20,800 tons per year.

(ii) Approximately 20,709 acres are irrigated of which approximately 400 acres have already been treated with sprinkler systems.

(iii) There are approximately 102 miles of major canals and laterals, not including the on-farm field ditches, in the Unit.

(iv) It is assumed that groundwater outflow concentration is relatively constant over time, entirely a function of mineral solubility in the water. Measured salt pickup is too large to be the result of only concentration effects of evapotranspiration. Hence, salt load is primarily a function of outflow volume, which can be reduced by irrigation efficiency improvements.

Salt Load Calculations

The calculation of salt loading is not simple. Data is sparse and expensive to acquire; so much so that treatment is often less expensive than data collection. Salt loading estimates are often a "best guess" based on data available. Nonetheless, agricultural salt loading can be observed and controlled and all long term indicators suggest that salinity control measures are effective and salt concentration in the river is being controlled cost-effectively. There are a number of scientific studies that have been completed and guide better estimates of natural salt loading from on-farm/off-farm features and reductions in loadings from changes in Management.

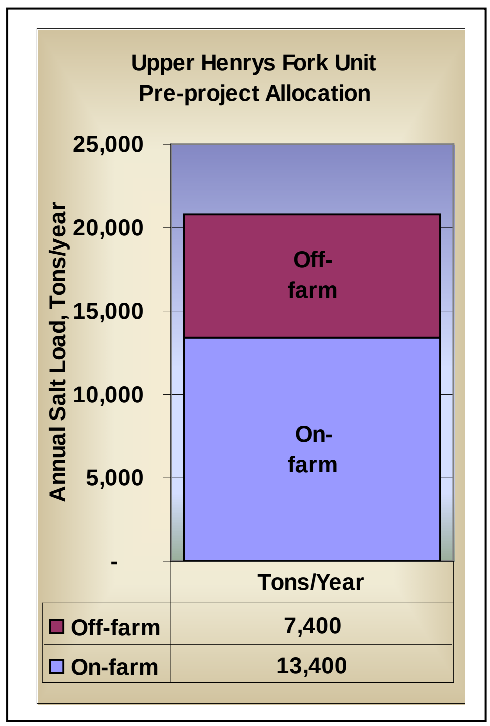

Figure 1. Pre-project salt load allocation.

Pre-project Salt Load Allocation

Agricultural salt loading is the result of canal seepage and leakage (off-farm) and deep percolation of irrigation water applied to fields (on-farm).

Using 20,800 tons per year as the total agricultural load, the salt budget implies that approximately 13,400 tons are from on-farm sources and 7,400 tons from off-farm canals and large laterals.

In order to assure that salt load evaluations are concurrent, salt loading for individual projects should be based on acres, tons per acre, and a percentage salt load reduction based on the change in irrigation practice. Past experience in other salinity areas suggests that improvements to the existing irrigation systems will be conversion from surface irrigations systems to sprinkler irrigation systems. Based on the reduction in deep percolation from the water budget, unimproved-flood-to-Wheel-line-sprinkler systems will reduce salt loading by an average of 84 percent and unimproved-flood-to-Center-Pivot will reduce salt loading by an average of 91 percent.

The four hundred acres that had been treated prior to the project were assumed to be loading 15 percent of the average pre-treated salt load or 40 tons per year. The remaining 13,360 tons of on-farm salt produced equates to 0.66 tons per acre per year for on-farm salt loading.

For the off-farm, 102 miles of main canals and large laterals have been mapped. The estimated off-farm salt loading is an average 73 tons per mile of canal. Funding of canal projects by NRCS is not anticipated. However, it is possible that other federal agencies could fund canal projects in the future in which case, additional evaluation of tons per mile values might be appropriate.

Plan Formulation and Alternative Plans

Plan Formulation

The first step in plan formulation was to determine the tons of salt being delivered to the Colorado River from the project area. The United States Geological Service (USGS) provided a report which calculated the salt loading from the project area. The loading was split between conveyance losses and on-farm irrigation application. During the resource inventory phase of planning the needs and opportunities for on-farm irrigation system improvements were identified. On-farm improvements include improved surface systems and conversion to sprinkler systems with some conversion of on-farm ditches to pipelines. There are no off-farm canal modifications (i.e. conversion to pipeline or canal lining) included in this plan.

Alternative B – Irrigation System Improvements, include measuring devices so that the amount of water delivered to each farm can be determined.

Alternatives Studied in Detail

Description of Alternative Plans

The objective of this EIS is specifically to reduce annual salt loading to the Colorado River System. Alternatives considered were limited to those which will reduce the source of the salt loading in the project area. This focused on conservation practices that reduced deep percolation of irrigation water that dissolve the geologic source of salts and transport them to the river system. Other water quality related conservation practices that do not affect the deep percolation salt loading source were not considered within the alternatives toward achieving that objective. The two alternatives considered in this EIS are:

(i) Alternative A – No-Action or Future Without Project (FWOP)

(ii) Alternative B – Irrigation System Improvements, the recommended alternative, which constitutes the recommended plan described in this document.

An alternative that included system canal lining/piping, in addition to the Alternative B – Irrigation System Improvements, was discussed several times throughout the planning process. This alternative (inclusive of canal lining/piping) was not considered in detail because 1) there are presently no plans or means to convert the canals to lined or piped systems; and 2) the on-farm irrigation system improvements as presented in Alternative B, the recommended plan, are the most cost-effective improvements to realize salt savings in the project area.

Alternative A – No-Action / Future Without Project (FWOP)

This alternative assumes that no salinity control program will be implemented. Other programs will continue to operate as they have in the past continuing ongoing activities with current programs and rates of implementation. This alternative is the benchmark from which the effects of other alternative plans are measured.

The management of irrigation water is not expected to change appreciably. On-farm irrigation application system improvement will occur at a much slower pace than with the recommended plan.

Limited delivery system improvements are expected. Annually, approximately 70,790 acre-feet of water is used for irrigation in the project area. This includes water diverted and stored in reservoirs. This volume is not expected to change overtime if Alternative A is chosen.

Deep percolation from the untreated 20,709 acres of irrigated pasture and hayland will continue at levels that contribute excessive amounts of salt to the Colorado River.

Alternative B – Irrigation System Improvements (recommended plan)

This alternative assumes that a limited salinity control project will be implemented. Existing financial and technical assistance programs will continue to operate as they have in the past. However this recommended plan will increase the available federal funds for assistance. It is assumed that on-farm irrigation water management will improve due to an increase in technical assistance provided by the NRCS field office and with improved irrigation system capabilities.

Through implementation of the project, on-farm irrigation application system improvements will occur at an accelerated rate as producers voluntarily sign-up for improved irrigation systems. It is estimated that through this alternative 70 percent of the irrigated acres in the project area will have improved irrigation systems. Most of the surface irrigation systems will be converted to side roll, center pivot, and pod sprinkler systems. The remaining 30 percent will remain as an unimproved irrigation system.

Figure 2. Pod sprinkler systems are a recent addition to the list of irrigation system improvement options (June 12, 2011).

A limited amount of on-farm delivery ditches that transport irrigation water from the canal to the field will be improved by converting from dirt ditch to buried pipe. This will reduce seepage and salt loading from these delivery ditches by 99 percent. There are no canal modifications (i.e. conversion to pipeline or canal lining) included in this plan.

Currently, approximately 70,790 acre feet of water are used for irrigation in the project area. This includes water directly diverted from streams and water stored in reservoirs. The irrigation system improvements outlined in this plan will provide more efficient use of this water. Deep percolation from the 14,096 acres is expected to be treated though the project action, reducing it by approximately 40 percent. The Colorado River salt loading attributed to this project area will be reduced by the reduction of excess deep percolation passing below the plant root zone. Deep percolation of irrigation water results in concentrating and transporting salt in groundwater through the soil and eventually ending up in the Colorado River.

This proposal is not intended to bring new land under irrigation or to provide water to fields that have been infrequently or marginally irrigated. Any project measure proposed on lands without an adequate irrigation history will not be considered for funding without prior approval by the appropriate state water authority.

The total cost of this alternative is estimated to be $24,851,431.

Comparison of Alternatives – Water/Salt Budget

The comparison of alternatives chart below summarizes the water/salt budget of alternative A – No-Action alternative and alternative B – Irrigation System Improvements, the recommended plan (RP).

Chart 5. Comparison of Alternatives.

Upper Henrys Fork	Alt. A No-Action (FWOP)	Alt. B (RP On-Farm Only)	Alt. A No-Action (FWOP)	Alt. B (RP On-Farm Only)	Alt. A No-Action (FWOP)	Alt. B (RP On-Farm Only)
Farm Delivery (Irrigation Season Only)			**tons/af**	**tons/af**	**tons**	**tons**
Project Acres, Untreated (ac)	19,100	4,220				
Project Acres, Treated (ac)	400	15,280				
Project Acres, Idle (ac)	1,209	1,209				
Average Evapotranspiration ET (in)	23.7	24.2				
Average Seasonal Efficiency (%)	0.35	0.60				
Irrigation Season Factor (% of season)	0.65	0.80				

	Alt. A No-Action (FWOP)	Alt. B (RP On-Farm Only)	Alt. A No-Action (FWOP)	Alt. B (RP On-Farm Only)	Alt. A No-Action (FWOP)	Alt. B (RP On-Farm Only)
Farm Delivery (af)	70,790	56,476	0.463	0.463	32,746	26,125
Delivery Spillage to River (af)	---	---	0.463	0.463	---	---
Delivery Seepage (af)	17,697	17,697	0.463	0.463	8,187	8,187
Net Diversion from River (af)	88,487	74,173	0.463	0.463	40,933	34,312
On-Farm Deep Percolation	**af**	**af**	**tons/af**	**tons/af**	**tons**	**tons**
Farm Delivery	70,790	56,476	0.463	0.463	32,746	26,125
Irrigation Evaporation	5,328	6,339	--	--	--	--
Crop ET	25,033	31,460	--	--	--	--
Tailwater Run-off	6,830	2,202	0.463	0.463	3,160	1,019
Tailwater Phreatophyte CU	6,147	81	--	--	--	--
On-Farm Deep Percolation	27,451	16,394	1.078	1.531	29,587	25,106
Delivery System GW Inflow Computation	**af**	**af**	**tons/af**	**tons/af**	**tons**	**tons**
Delivery System Seepage	17,697	17,697	0.463	0.463	8,187	8,187
Phreatophyte CU	2,389	2,389	--	--	--	--
Delivery System GW Inflow	15,308	15,308	0.535	0.535	8,187	8,187
Winter Water GW Inflow	**af**	**af**	**tons/af**	**tons/af**	**tons**	**tons**
Delivery System Seepage	--	--	0.463	0.463	--	--
Stock Pond Seepage	--	--	0.463	0.463	--	--
Winter Water GW Inflow	--	--	--	--	--	--
Groundwater Inflow Components	**af**	**af**	**tons/af**	**tons/af**	**tons**	**tons**
On-Farm Deep Percolation	27,451	16,394	1.078	1.531	29,587	25,106
Delivery System GW Inflow	15,308	15,308	0.535	0.535	8,187	8,187
Winter Water GW Inflow	--	--	--	--	--	--
TOTAL	42,759	31,702	0.883	1.050	37,773	33,293
Groundwater Outflow Components	**af**	**af**	**tons/af**	**tons/af**	**tons**	**tons**
Computed Phreatophyte CU	21,380	15,851	--	--	--	--
Groundwater Outflow	21,380	15,851	3.000	3.000	58,573	47,553
TOTAL	42,759	31,702	1.370	1.500	58,573	47,553
Regional Salt Pickup (tons)					20,800	14,260
GW Outflow Salt Load Reduction						6,540
Total Phreatophyte Use	--	18,321	(18,321)	27,106	-209%	
USDA Improvements	**On-Farm**	**Off-Farm**	**Total**			
Return Flow Reduction (af)	5,529	--	5,529			
Salt Load Reduction (tons)	6,540	--	6,540			
Change in Colorado River Flow (af) increase)	8,785	--	8,875			

FWOP – Future Without Project (Alternative A - No-Action Alternative)

Environmental Impacts

This section is the scientific and analytical basis for the comparison of the alternatives. The environmental consequences in this chapter are organized by the two alternatives for resource topic headings.

Comparison of Alternatives – Environmental Quality and Economic Development

The Comparison of Alternatives chart below summarizes the effects of each alternative on key economic, social, environmental, cultural, or other concerns.

Chart 6. Comparison of Alternatives – Environmental Quality and Economic Development.

EFFECTS	Alternative A NO-ACTION (FUTURE WITHOUT PROJECT)	Alternative B RECOMMENDED PLAN (RP)
Environmental Quality		
Water Quantity	Without the salinity project the quantity of water is expected to remain similar to current conditions.	With the installation of the proposed salinity control project, the water budget estimates that the consumptive use of the crops will increase from 30,361 acre-feet per year to 37,799 acre-feet per year due to changes in the crops produced. However with the improved irrigation systems and the resulting reduction of runoff, it is estimated that phreatophyte consumptive use of tailwater will decrease from 6,147 acre-feet per year to 81 acre-feet per year. This yields a net increase in water use of 1,372 acre-feet per year or 0.1 acre-feet per year per acre treated.
Water Quality	Water quality will continue to decline from salts and contaminants in surface and subsurface return flows, tailwater flow gully erosion, and irrigation-induced soil salinization.	Water quality will generally improve from 1) reduced surface and subsurface return flows carrying salts and contaminants; and 2) reduced gully erosion from return flows.
Soils	Incidences of flood irrigation-induced soil salinization will continue to increase and exacerbate poor soil health with cumulative effects.	Soil salinization induced from flood irrigation will be nearly eliminated for those systems converted to sprinkler systems. Soluble salts remaining in the soil profile after conversion may be leached to tolerable levels over time by natural precipitation and sprinkler irrigation.
Erosion and Sedimentation	Gully erosion from flood irrigation return flows may continue to increase.	Gully erosion induced from flood irrigation surface return flows will be nearly eliminated for those systems converted to sprinkler systems.

EFFECTS	Alternative A NO-ACTION (FUTURE WITHOUT PROJECT)	Alternative B RECOMMENDED PLAN (RP)
Air	No change/effect	No change/effect
Plants	Irrigation-induced soil salinization will continue; resulting saline soil will limit desirable species of hayland, wetland, or riparian vegetation. Conditions in hay fields caused by saturation of the soil and reduced soil temperatures from cold water application limit production and survival of desirable species.	Irrigation-induced soil salinization from flood irrigation will be greatly reduced for those areas that are converted to sprinkler systems. Desirable plants will not be limited by salt accumulation in these areas. Soluble salts remaining in the soil profile after conversion may be leached to tolerable levels over time by natural precipitation and sprinkler irrigation, further improving plant conditions.
Animals	No change. Animal habitat expected to stay similar.	Irrigation-induced wetland acreage expected to decline by 800 acres. Wetland-dependent species likely to decrease. Upland/forage dependent species may increase.
Cultural Resources	No change.	Potential for adverse effects. All activities related to Alternative B (RP) have the potential to adversely affect cultural resources. They will be Federal undertakings and are subject to Section 106 review under the NHPA.
Endangered and Threatened Species	No change. Wildlife habitat expected to remain similar. Conditions for endangered and threatened species likely to remain similar.	Adverse impacts to endangered Colorado River fish due to net depletions of 1,372 acre-feet of water, although some benefit due to improved water quality. Possible negative impacts to whooping cranes. Minimal impacts to other endangered and threatened species. Negative impact to wetland associated state species of concern such as common loon and trumpeter swan, otherwise, minimal effects.
Environmental Justice	Technical and financial assistance for irrigation improvements will continue at current rates. EQIP has provisions to provide increased payment rates for Historically Underserved (limited resource farmers/ranchers, beginning farmers/ranchers, socially disadvantaged producers, and Tribal) producers.	Irrigation improvements will be provided through NRCS EQIP at accelerated rates with increased program funding assistance. EQIP has provisions to provide increased payment rates for Historically Underserved (limited resource farmers/ranchers, beginning farmers/ranchers, socially disadvantaged producers, and Tribal) producers.
Essential Fish Habitat	No change. Fish habitat expected to remain similar.	Net depletions will have a small adverse impact on endangered Colorado River fish. Improvements to water quality and diversions will be beneficial or benign to fish species.
Floodplain Management	No change.	No change.

EFFECTS	Alternative A NO-ACTION (FUTURE WITHOUT PROJECT)	Alternative B RECOMMENDED PLAN (RP)
Invasive Species	No change/effect	No change/effect
Migratory Birds, Bald and Golden Eagle	No change. Habitat for migratory birds, bald and golden eagles likely to remain similar.	Neo-tropical migrants likely to be adversely impacted. Wet meadow associated birds likely to be adversely impacted. Waterfowl impacts likely to be minimal. Bald and Golden Eagle impacts expected to be minimal.
Prime and Unique Farmlands	None present	None present
Riparian Areas	No change. Riparian vegetation likely to remain similar.	Riparian vegetation associated with on-farm delivery ditches likely to be adversely impacted in some areas. Vegetation near rivers and streams expected to have minimal impact.
Wetlands	Minor reduction in acreage due to irrigation-induced erosion of the sites.	Adverse impact expected on 800 acres of irrigation-induced wetlands. Possible minor impacts to 2,732 acres of naturally occurring wetlands and another 2,199 acres of irrigation-induced wetlands.
Wild and Scenic Rivers	No change/effect.	No change/effect.
Social and Economic Characteristics	Continued low productivity hay and forage enterprises in project area. No downstream benefits from salt reduction to Colorado River users.	35-year net present value estimate of $34.8 million in private benefits from increased hay and forage productivity. $8.5 million NPV in public benefits from reduced downstream impacts of salt. 14,096 acres treated. Combined public & private benefit-cost ratio 1.7:1
Social and Economic Characteristics	Continued low technology ranching operations.	Potential for higher incomes and local ranch sector investment. Probable those landowners who participate in conservation will invest in better facilities and equipment to maintain higher quality forage. Investments will accrue to local and regional agricultural economic sectors.
Economic Development		
Estimated Project Cost	—	$24,851,431
Annualized Benefits	—	
Annualized Costs	—	
Net Benefits	—	
Benefit-Cost Ratio	—	1.7 : 1 (Public & Private)

Alternative A – No-Action / Future Without Project (FWOP)

Water

Presently, the 6,540 tons of salt loading that would be removed in Alternative B will continue to flow to the Henrys Fork, Green, and Colorado River System.

In theory, water quality conditions could slowly improve on a limited scale, as producers move from flood irrigation to sprinkler irrigation. Surface and subsurface return flows from excess flood irrigation will continue to carry silt, dissolved salts, and pollutants to the Henrys Fork River and Colorado River system. In the no-action alternative, the extent of this conversion would be limited, very slow to transpire, and would be dependent on continued USDA program funding availability. Since the extents of these variables are theoretical, estimations of effects are not possible and thereby not explored in detail in this document.

Slower and limited adoption of sprinkler irrigation practices will lead to failure to meet federal salt reduction goals in the Colorado River. Silt in flood irrigation water will continue to cause negative impacts to producers. Currently, fine silt deposits at heads of fields lead to increased permeability, which in turn results in increases in volume and velocity of flood irrigation water to allow sufficient water to reach bottoms of fields.

Gully erosion caused by flood irrigation tailwater dropping down steep slopes and into the river will continue and thereby deepen and widen active gullies transporting silt into the Henrys Fork River. This will increase the amount of sediment entering the system.

Soil Salinization – In some areas salts are accumulating on the soil surface as excess irrigation water leaches salts from the soil profile and then as they near the surface, the water evaporates leaving higher salt concentrations on the soil surface. Rain and snowmelt runoff can dissolve and carry these surface salts directly to streams and ponds, reducing water quality.

In the no-action alternative, the quantity of water is expected to remain similar to current conditions.

Soils

Some of the irrigated fields lie on a bench 40 to 80 feet above the Henrys Fork River and floodplain. Gully erosion, caused by flood irrigation tailwater dropping down steep slopes and into the river, will continue thus deepening and widening active gullies.

Irrigation-induced soil salinization will continue unabated. Increasing salt levels will accumulate thereby reducing soil health.

Air

The project area experiences no violations of air quality standards. Without the salinity project the area's future air quality is expected to remain similar to what it is today.

Plants

Irrigation-induced soil salinization will continue in some areas. The resulting saline soil limits desirable species of hayland, wetland, or riparian vegetation. In some extreme situations salt levels can become too high for vegetation and white salt deposits remain on the soil surface.

Conditions in hay fields caused by saturation of the soil and reduced soil temperatures from cold water application limit production and survival of agronomically desirable species.

Animals

Without the salinity project the future condition of habitat for fish and wildlife in the area is expected to remain similar to what it is today.

Cultural Resources

The USDA-NRCS has consulted with the Wyoming State Historic Preservation Office and the Utah State Historic Preservation Office regarding potential effects to cultural resources from the no action alternative. All activities related to the no action alternative with a potential to adversely affect cultural resources will be Federal undertakings and are subject to Section 106 review under the National Historic Preservation Act. Specific concerns to cultural resources that result from the no action alternative for the Henrys Fork Salinity project will be addressed on a project-by-project basis during Section 106 review. Concurrence letters from the Wyoming and Utah SHPOs are included with this document in Appendix C.

Endangered and Threatened Species

Without the salinity project the future condition of the area for federally listed species and state species of concern is expected to remain similar to what it is today. Presence and abundance data for these species is generally lacking in the project area, but assumed to be quite low, if not non-existent.

Environmental Justice

Technical and financial assistance for irrigation improvements will continue at current rates. EQIP has provisions to provide increased payment rates for Historically Underserved (limited resource farmers/ranchers, beginning farmers/ranchers, socially disadvantaged producers, and Tribes) producers.

Essential Fish Habitat

Without the salinity project the future condition of fish habitat in the area is expected to remain similar to what it is today.

Floodplain Management

No effects anticipated.

Invasive Species

The project area contains populations of several State designated and prohibited noxious weeds as well as pests that have been designated by the County. For example, Canada thistle, Russian Olive, and mosquito species are commonly encountered. No Class 1,2, or 3 Aquatic Invasive species are known to exist in the project area, however at least three Class 4 species or groups have been reported in within the Green River watershed: burbot, white sucker, and non-native trout species.

Without the project, the existing on-farm irrigation ditches will continue to harbor and facilitate the spread of invasive weeds. It is unknown if those unaltered ditches will pose any appreciable increased risk for establishment and/or spread of the listed Aquatic Invasive Species.

Wyoming Designated Noxious Weeds .S. 11-5-102 (a)(xi) and Prohibited Noxious Weeds W.S. 11-12-104:

- Field bindweed (Convolvulus arvensis L.)
- Canada thistle (Cirsium arvense L.)
- Leafy spurge (Euphorbia esula L.)
- Perennial sowthistle (Sonchus arvensis L.)
- Quackgrass (Agropyron repens (L.) Beauv.)
- Hoary cress (whitetop) (Cardaria draba and Cardaria pubescens (L.) Desv.)
- Perennial pepperweed (giant whitetop) (Lepidium latifolium L.)
- Ox-eye daisy (Chrysanthemum leucanthemum L.)
- Skeletonleaf bursage (Franseria discolor Nutt.)

- Russian knapweed (Centaurea repens L.)
- Yellow toadflax (Linaria vulgaris L.)
- Dalmatian toadflax (Linaria dalmatica (L.) Mill.)
- Scotch thistle (Onopordum acanthium L.)
- Musk thistle (Carduus nutans L.)
- Common burdock (Arctium minus (Hill) Bernh.)
- Plumeless thistle (Carduus acanthoides L.)
- Dyers woad (Isatis tinctoria L.)
- Houndstongue (Cynoglossum officinale L.)
- Spotted knapweed (Centaurea maculosa Lam.)
- Diffuse knapweed (Centaurea diffusa Lam.)
- Purple loosestrife (Lythrum salicaria L.)
- Saltcedar (Tamarix spp.)
- Common St. Johnswort (Hypericum perforatum)
- Common Tansy (Tanacetum vulgare)
- Russian olive (Elaeagnus angustifolia L.)

Uinta County Weed and Pest Declared List Amended February 2010:

- Black henbane (Hyoscyamus niger L.)
- Mosquito (Culicidae spp.)
- Yellow starthistle (Centaurea *solstitialis* L.)
- Viper’s bugloss (Echium vulgare L.)
- Sheep keds (Melophagus ovinus)

Wyoming Aquatic Invasive Species Management Plan, Wyoming Game and Fish Department (WYG&F) September 2010:

Priority Class 1 species are those not known to be present in Wyoming, but that have a high potential to invade. Management techniques for these species are impractical, ineffective, or unknown.

- Zebra mussel
- Quagga mussel
- Rusty crayfish
- Asian carp
- Viral hemorrhagic septicemia
- Hydrilla

Priority Class 2 species are present in Wyoming and have the potential to spread. Management techniques for these species may be ineffective in some instances.

- New Zealand mudsnail
- Whirling disease
- Asian clam

Priority Class 3 species are those not known to be present in Wyoming, have a high potential to invade, but some management techniques are available for these species.

- Eurasian watermilfoil

Priority Class 4 species are present in Wyoming and have the potential to spread, but some management techniques are available for these species.

- Nonnative invasive fish - (nonnative trout, burbot, walleye, white sucker, brook stickleback)

Migratory Birds / Bald and Golden Eagle

Without the salinity project the future condition of habitat for migratory birds, along with bald and golden eagles, is expected to remain similar to what it is today. Many sitings of migratory birds and bald and golden eagles are recorded annually, but no estimate of breeding density is currently available, due to limited inventory data.

Prime and Unique Farmlands

There will be no effect on Prime and Unique Farmlands. According to the “Soil Survey of Henrys Fork Area, Utah-Wyoming – Parts of Daggett and Summit Counties, Utah and Sweetwater and Uinta Counties, Wyoming” published in 1988, there are no prime and unique farmlands as defined by the Natural Resources Conservation Service (NRCS) “National Soil Survey Handbook (NSSH)”, Part 622.04 – Prime Farmland Soils.

Riparian Areas

Weedy, brushy, and treed areas along irrigation ditches, creeks, and rivers provide important cover and roosting habitat for many wildlife species. Over time some of these areas have lost understory vegetation and recruitment of young native species. This understory vegetation provides important floodplain functions like slowing flood water, increasing infiltration, and trapping sediment which is an important source of nutrients for these areas. In some areas, the remaining decadent stands of cottonwood will soon die off, leaving no wildlife habitat or protection for livestock and wildlife from winter winds.

Figure 3. Henrys Fork River riparian area (January 12, 2012)

Wetlands

Without the salinity project the future extent and condition of wetlands in the area is expected to remain similar to what it is today, approximately 5,631 total acres, with approximately 2,899 acres being natural.

Wild and Scenic Rivers

No designated Wild or Scenic Rivers occur within the project or Henrys Fork watershed area.

Social and Economic Characteristics

Land Use: The land use in the area is not expected to change as a result of Alternative A. No new land will be brought into production. The distribution of the various land uses is not expected to change.

Capital and Labor: Alternative A will not have an impact on the capital available in the project area. The labor base will not be affected.

Management Level: The management level related to the irrigated hayland will continue to be below optimum for the majority of the area. The labor to manage irrigation water will continue to be intensive due to the lack of improved irrigation systems being installed.

Profitability: The overall profitability of the project area will not be impacted dramatically. There will not be a labor savings due to the lack of improved irrigation systems being installed. Crop production will not change appreciably.

Economics: There is no appreciable economic change in the Alternative A no action - future without project. Without any applied conservation practices, it is assumed that there is no change in any of the major economic factors in the project area: implementation costs, irrigation operation costs, hay productivity or salinity reduction. No private or public benefits are accrued. The opportunity costs of no action are continued salt loading in the Colorado River and unrealized hay productivity.

Alternative B – Irrigation System Improvements (recommended plan)

Water

Under the Proposed Action, water quality will improve downstream in a cumulative fashion in a shorter period of time. Dissolved salts and pollutants sent downstream will decrease as return flows from deep percolation are reduced. Under the Proposed Action, it is more likely that salt reduction requirements in the Colorado River will be achieved. As stated in the hydrosalinity analysis for the Proposed Action, 400 acres treated pre-project (converted from unimproved flood irrigation to sprinkler irrigation) are assumed to be loading 15 percent of their pre-treated salt load, or 40 tons per year. The remaining 13,360 tons of on-farm salt produced equates to 0.66 tons per acre per year.

Water quality will be improved by the reduction of gully erosion caused by tailwater from flood irrigation and by the reduction of nutrients and contaminants present in irrigation tailwater or leached through the soil profile and reentering the river system. Water quality will also be improved by the reduction of irrigation-induced soil salinization for those areas where flood irrigation is replaced by sprinkler systems.

Most new sprinkler systems that divert and pump water from canals or the Henrys Fork River will require settling structures. These structures will allow much of the silt to drop out of the water before being sent through the system. These structures will extend the life of the irrigation system and reduce the rate of silting of croplands. On-farm ditches will be replaced by pipes to sprinkler lines, reducing the amount of time and money spent on ditch maintenance. The installation of sprinklers could also result in less diversion from the Henrys Fork River System to meet irrigation requirements, less velocity through the canals, and less silt transport in the canals.

For sprinkler treated fields, water requirements are cut nearly in half as compared to flood irrigated fields. The conserved water is then used to bring under-irrigated areas up to maximum productivity or to reduce diversion and depletion from the river.

Additionally, producers experience multiple problems related to water applied using flood irrigation. Some examples of the types of problems that can be addressed through increased irrigation efficiency are logistical difficulties in timing and duration of irrigation activities, excess soil erosion, tillage requirements, salt damage to crops, and waste of water resources due to having to run more water down furrows than is necessary just to make sure water reaches the bottom of all rows. Increasing irrigation efficiency by converting to sprinkler irrigation will address each of these private agricultural production concerns.

With the installation of the proposed salinity control project, the water budget estimates that the consumptive use of the crops will increase from 30,361 acre-feet per year to 37,799 acre-feet per year due to changes in the crops produced. However, with improved irrigation systems and the resulting reduction of runoff, it is estimated that phreatophyte consumptive use of tailwater will decrease from 6,147 acre-feet per year to 81 acre-feet per year. This yields a net increase in water use of 1,372 acre-feet per year or 0.1 acre-feet per year per acre treated.

Soils

Irrigation tailwater from flood irrigation will be nearly eliminated for those fields that are converted to sprinkler systems. Gully erosion caused by tailwater from the former flood systems will be greatly reduced. Irrigation-induced soil salinization will be reduced considerably for areas fed by flood irrigation-induced deep percolation or tailwater from systems converted to sprinkler systems. The soil health in these areas will benefit from reduced saturation and temperatures that have been reduced by over-application of cold irrigation water.

Air

The project area may experience some slight increase in the number of irrigation pumping plants. It is expected that most irrigation systems will be gravity flow, and will need no supplemental pumping source. No appreciable changes in air quality are expected.

Plants

Irrigation-induced soil salinization from flood irrigation will be greatly reduced for those areas that are converted to sprinkler systems. Desirable plant communities in hayland, natural wetlands, and riparian areas will not be degraded by increasing salt accumulations. Soluble salts remaining in the soil profile after conversion may be leached to tolerable levels over time by natural precipitation and sprinkler irrigation.

Soil health diminished by flood irrigation caused soil saturation and lower soil temperatures will improve for those areas converted to sprinkler irrigation. This will allow native or desirable (in the case of hayland) species to thrive.

Animals

Estimates are that 5,631 acres of the approximately 21,000 acre proposed salinity project area are wetland. Some of this wetland is artificial from ditch seepage and on-farm flood irrigation systems. Other wetlands found in and adjacent to the irrigated fields are naturally occurring and being supported by the many streams, rivers, and slope wetlands (receiving water from the Uinta Mountains) within the project area. Please refer to the Wetland Setting Section of this document for further discussion.

Several thousand acres of predominately artificial wetland could be impacted by salinity control measures as ditches and canals are piped and on-farm irrigation systems are improved. The actual extent of wetland impact is not known at this time and depends on the amount of participation in the program, the exact location of salinity measures, and the specific salinity control practices that are implemented.

Because the intent of the salinity program is water conservation through improved on and off-farm measures, it is expected that at least 800 acres may have their water regime changed enough to impact the plant community that grows there. This change should be toward drier conditions and trend away from the existing sedge, rush, and willow plant communities found on much of the project area. As fields become drier and more desirable agricultural forage plants become established, these plant communities will favor some wildlife species while no longer providing habitat, or reducing habitat condition, for other species.

It is assumed there will be a reduction of habitat for wetland dependent species and an increase in habitat for species that prefer drier more upland habitat as the salinity project is implemented.

Refer to the federally listed species and state species of concern section for estimates of impact to those species as salinity measures are implemented.

Cultural Resources

The USDA-NRCS has consulted with the Wyoming State Historic Preservation Office and the Utah State Historic Preservation Office regarding potential effects to cultural resources from the recommended plan. All activities related to the recommended plan with a potential to adversely affect cultural resources will be Federal undertakings and are subject to Section 106 review under the National Historic Preservation Act. Specific concerns to cultural resources that result from the Henrys Fork Salinity project will be addressed on a project-by-project basis during Section 106 review. Concurrence letters from the Wyoming and Utah SHPOs are included with this document in Appendix C.

Endangered and Threatened Species

The proposed salinity project is located in the northwest portion of Daggett County Utah, the northeast part of Summit County Utah, the southwest portion of Sweetwater County Wyoming, and the southeast part of Uinta County Wyoming.

Federally listed species in Daggett and Summit Counties, Utah

Endangered Status:

- Bonytail Chub (Gila elegans) [1]
- Colorado Pikeminnow (Ptychocheilus lucius) [1]
- Humpback Chub (Gila cypha) [1]

[1] There is designated critical habitat for the species in the downstream riverine habitat in the Green and Colorado River systems. If the proposed action may lead to consumptive use of water or have the potential to affect water quality in the Colorado River system, there may be impacts to endangered and threatened species inhabiting the downstream reaches of this river system. Water depletions from any portion of the occupied drainage basin are considered to adversely affect or adversely modify the critical habitat of the endangered fish species and must be evaluated.

[2] "Western" Yellow-billed Cuckoo = distinct population segment in Utah.

- Razorback Sucker (Xyrauchen texanus)

Threatened Status:

- Ute Ladies'-tresses (Spiranthes diluvialis)
- Canada Lynx (Lynx Canadensis)

Candidate Status:

- Yellow-billed cuckoo (Coccyzus americanus) [2]
- Greater Sage-grouse (Centrocercus urophasianus)

Federally listed species for Sweetwater and Uinta Counties, Wyoming

Endangered Status:

- Black-footed Ferret (Mustela nigripes)
- Bonytail Chub (Gila elegans) [1]
- Colorado Pikeminnow (Ptychocheilus lucius) [1]
- Humpback Chub (Gila cypha) [1]
- Razorback Sucker (Xyrauchen texanus)

Threatened Status:

- Ute Ladies'-tresses (Spiranthes diluvialis)

Candidate Status:

- Yellow-billed cuckoo (Coccyzus americanus)
- Greater Sage-grouse (Centrocercus urophasianus)

[1] There is designated critical habitat for the species in the downstream riverine habitat in the Green and Colorado River systems. If the proposed action may lead to consumptive use of water or have the potential to affect water quality in the Colorado River system, there may be impacts to endangered and threatened species inhabiting the downstream reaches of this river system. Water depletions from any portion of the occupied drainage basin are considered to adversely affect or adversely modify the critical habitat of the endangered fish species and must be evaluated.

[2] "Western" Yellow-billed Cuckoo = distinct population segment in Utah.

State Species of Concern:

A review of the Utah Division of Wildlife Resources Utah Conservation Data Center biodiversity information containing lists of sensitive species in the state compiled using known species occurrences and species observations from the Utah Natural Heritage Program's Biodiversity Tracking and Conservation System (BIOTICS) identified the species listed below:

- Bald Eagle (Haliaeetus leucocephalus)
- Bear Lake Sculpin (Cottus extensus)
- Black-footed Ferret (Mustela nigripes)
- Bluehead Sucker (Catostomus discobolus)
- Bobolink (Dolichonyx oryzivorus)
- Bonneville Cutthroat Trout (Oncorhynchus clarkii utah)
- Brown (Grizzly) Bear (Ursus arctos)
- Canada Lynx (Lynx canadensis)
- Colorado Pikeminnow (Ptychocheilus lucius)
- Colorado River Cutthroat Trout (Oncorhynchus clarki pleuriticus)
- Columbia Spotted Frog (Rana luteiventris)
- Desert Mountainsnail (Oreohelix peripherica)
- Ferruginous Hawk (Buteo regalis)
- Flannelmouth Sucker (Catostomus latipinnis)
- Fringed Myotis (Myotis thysanodes)
- Greater Sage-grouse (Centrocercus urophasianus)
- Humpback Chub (Gila cypha)
- Lewis's Woodpecker (Melanerpes lewis)
- Northern Goshawk (Accipiter gentilis)
- Northern Leatherside Chub (Lepidomeda copei)

- Razorback Sucker (Xyrauchen texanus)
- Roundtail Chub (Gila robusta)
- Short-eared Owl (Asio flammeus)
- Smooth Green Snake (Opheodrys vernalis)
- Three-toed Woodpecker (Picoides tridactylus)
- Townsend’s Big-eared Bat (Corynorhinus townsendii)
- Western Pearlshell (Margaritifera falcata)
- Western Toad (Bufo boreas)
- White-tailed Prairie Dog (Cynomys leucurus)

A review of the Wyoming Game and Fish Department (WYG&F) Tier I state species of concern general distribution maps for species that may occur in the Wyoming portion of the proposed salinity project area identified the species listed below. The WYG&F has determined (in their 2010 State Wildlife Action Plan) three tiers of Native Species Status (NSS) in the state. The Tier I species are those of highest concern while those in the Tier III category are of lowest concern based on their population trends and habitat status. By policy, NRCS in Wyoming considers the WYG&F Tier I category to be the state species of concern when assessing agency actions.

Tier I Species in Wyoming:

- Bald Eagle (Haliaeetus leucocephalus)
- Bluehead Sucker (Catostomus discobolus)
- Boreal Toad (Bufo boreas boreas)
- Colorado River Cutthroat Trout (Oncorhynchus clarki pleuriticus)
- Flannelmouth Sucker (Catostomus latipinnis)
- Greater Sage-grouse (Centrocercus urophasianus)
- Midget Faded Rattlesnake (Crotalus viridis concolor)

Tier II Species in Wyoming:

- Cliff Tree Lizard (Urosaurus ornata wrighti)
- Fringed Myotis (Myotis thysanodes)
- Great Basin Gophersnake (Pituophis melanoleucas deserticola)
- Long-eared Myotis (Myotis evotis)
- Long-legged Myotis (Myotis volans)
- Spotted Bat (Euderma maculatum)
- Townsend's Big-eared Bat (Corynorhinus townsendii)

Using the Wildlife Inventory Resource Locator (WIRL) developed by Wyoming NRCS in cooperation with University of Wyoming to query federally listed species as well as WYG&F Tier I and II species found in the Wyoming Natural Diversity Database of Species Observations identified the following species in the Wyoming portion of the proposed salinity project. Crucial yearlong range as well as crucial winter range of big game species is also included in WIRL.

Wyoming WIRL Species:

- Bald Eagle (Haliaeetus leucocephalus)
- Bluehead Sucker (Catostomus discobolus)
- Boreal Toad (Bufo boreas boreas)
- Canada Lynx (Lynx canadensis)
- Colorado River Cutthroat Trout (Oncorhynchus clarki pleuriticus)
- Common Loon (Gavia immer)
- Flannelmouth Sucker (Catostomus latipinnis)
- Greater Sage-grouse leks and grouse (Centrocercus urophasianus)
- Long-eared Myotis (Myotis evotis)
- Midget Faded Rattlesnake (Crotalus viridis concolor)

- Roundtail Chub (Gila robusta)
- Trumpeter Swan (Cygnus buccinator)
- Whooping Crane (Grus americana)
- Yellow-billed Cuckoo (Coccyzus americanus)
- Crucial yearlong and winter range for Moose (Alces alces), Elk (Cervus canadensis), Pronghorn Antelope (Antilocapra americana), and Mule Deer (Odocoileus hemionus) exists in the proposed project area as well

Formal consultation has taken place with the Utah and Wyoming state fish and wildlife agencies, as well as the Utah and Wyoming U.S. Fish and Wildlife Service (USFWS) to request species of concern lists and information for the proposed salinity project. The above listed Utah and Wyoming state species of concern did come from databases of actual observations in the proposed project area.

Note that consultation with U.S. Fish and Wildlife Service (USFWS) on Historic Depletion to the Colorado River System for the project area has occurred and their response is captured in the attached Biological Opinion (Appendix E) along with their concurrence on effects to other threatened and endangered species. If candidate species or other species are determined to be threatened or endangered, additional formal consultation would be required.

Impact to Species of Concern

Black-footed ferrets should not be impacted if the prairie dogs in the area are not removed because of measures associated with irrigation systems improvement. The extent of this possibility is not known.

Estimated changes in water quality, although not guaranteed, are expected to be beneficial or benign for the many fish species in the area (including least chub, bluehead sucker, Colorado River cutthroat trout, flannelmouth sucker, roundtail chub, Bonneville cutthroat trout, and northern leatherside chub), as well as downstream to the Green and Colorado River systems endangered fish (bonytail chub, Colorado pikeminnow, humpback chub, and razorback sucker). Net depletions from the project of 1,372 acre-feet, although small, would adversely impact the endangered Colorado River fish species listed above. Consultation with the USFWS to address this issue as outlined in the Colorado River Recovery Plan has occurred as of December 5, 2012. A depletions charge of $19.82 per acre-foot will be assessed.

Much of the project area and irrigated fields may be potential habitat for the threatened Ute Ladies'-tresses orchid, although much of the area is above the theoretical elevation limit of the species. No inventories or evaluation to determine existence of suitable habitat for Ute's has been made. Because of this, potential occurrence, or impact is not known. As individual project-related practices are planned, the sites would be analyzed as potential habitat utilizing criteria derived from *Recommendations and Guidelines for Ute Ladies' – Tresses Orchid (Spirantes diluvialis) Recovery and Fulfilling Section 7 Consultation Responsibilities* (USFWS, 1995*)*. If the site is determined potential habitat, the project would not be implemented until an on-site survey can be conducted during the normal *Ute Ladies' – Tresses* bloom period. If the survey results in a positive identification of *Ute Ladies' – Tresses*, the project would not proceed until appropriate mitigation measures are identified and negotiated.

Canada lynx would not be impacted.

Yellow-billed cuckoos have been observed in the project area. As long as the cottonwood and willow riparian habitat they use is not disturbed, there would be no appreciable impact. There is the possibility that the implementation of irrigation systems may cause the removal of willows and cottonwoods along irrigation ditches for the operation of the systems. The extent of this possibility is not known at this time, but this would have a minor impact on Yellow-billed cuckoos due to their association with large, riparian corridors rather than these small riparian stringers. Improvements to the Henry's Fork River itself related to the removal of push-up dams and possibilities for improved grazing and wildlife management, with facilitating practices, could result in enhanced Yellow-billed cuckoo habitat through improved cottonwood, willow, and understory recruitment.

Impact to greater sage-grouse is not expected so long as irrigation measures do not impact leks, nesting, brood rearing, or winter habitat in the project area. Some of the wet-irrigated fields, or meadows, would become drier providing less brood rearing habitat while an increase in the forb component of fields as irrigation systems are improved would provide better habitat in terms of insects and food-forbs.

If prairie dog colonies are removed, it would have a negative impact on mountain plovers. If shortgrass, or disturbed areas in the project area are improved yielding a greater amount of vegetative cover, there would be an adverse impact to mountain plovers, although this is not expected.

Much bald eagle use in the proposed project area is documented. No evaluation or inventory for the presence of bald eagle nests, or winter roosts, in the mature cottonwoods along the rivers has been made to assess potential impact. However, as long as mature cottonwoods are not destroyed and disturbance from construction does not occur during sensitive periods (i.e. nesting) impacts to bald eagles would be minimal.

Minimal impact to the many bat species (fringed myotis, Townsends big-eared bat, long-legged bat, and pallid bat) that may use the area, or other bird species of concern (Lewis's woodpecker, northern goshawk, three-toed woodpecker, short-eared owl, or ferruginous hawk), is expected so long as the woody dominated riparian areas are not impacted, or trees and shrubs removed.

There may be a minimal impact to western boreal toads and Columbia spotted frogs pending the amount of irrigation-induced wetland and wet-irrigated fields that become drier through salinity measures. The extent of such potential impact is not known.

Minimal impact on desert mountainsnail or western pearlshell is expected.

Minimal impact is expected on the Great Basin gophersnake or the midget faded rattlesnake with salinity measures. As irrigation-induced wetlands and wet-irrigated fields become drier it may provide better, or worse, habitat for these species.

Water conservation measures may have an impact on wetlands and wet flood irrigated fields in the project in terms of making them drier. This would have a negative impact on the common loons, trumpeter swans, and whooping cranes that have been observed using the project area. The extent of such change is not known.

Environmental Justice

Program assistance for the project in Alternative B – Irrigation Improvements, will be provided through the NRCS Environmental Quality Incentives Program (EQIP). EQIP has provisions to provide increased payment rates for Historically Underserved (limited resource farmers/ranchers, beginning farmers/ranchers, socially disadvantaged producers, and Tribes) producers.

Essential Fish Habitat

Estimated changes in water quality, although not guaranteed, are expected to be beneficial or benign for the many fish species in the project area (including species of concern least chub, bluehead sucker, Colorado River cutthroat trout, flannelmouth sucker, roundtail chub, Bonneville cutthroat trout, and northern leatherside chub), as well as downstream to the Green and Colorado River systems endangered fish (bonytail chub, Colorado pikeminnow, humpback chub, and razorback sucker).

Assuming there will be an improvement in water quality (salinity reduction and reduced pollutants inputs from nutrients, pesticides, and temperature) it would be beneficial for many of the trout/salmonid fish species in the project area. Some of the suckers and chubs may not benefit from improved water quality.

Effects to water quantity and instream flow will be analyzed along with subsequent impacts on the fish species living in the streams and rivers in the project area if the project moves forward. It could be that the overall water conservation yielding salt reduction could reduce instream flow on an average annual basis compared to the existing flows associated with over-irrigation from flood irrigation systems. However, it seems more likely that less water will be diverted out of the stream system due to more efficient irrigation systems requiring less water be applied and thus more water should remain in the water courses, especially during the spring and summer irrigation season. This would result in an increase in instream flows on an average annual basis. Under this scenario, the hydrograph may be altered so that stream flows are lower late in the growing season and higher early in the growing season. Given the gravelly nature of the substrate, return flows are not expected to be delayed to any great extent, but amount of return flow may be diminished if less water is initially removed from Henry's Fork for irrigation use. Exact effects will not be known until the project is implemented and under no circumstances are increases to instream flow guaranteed.

Any reduction in fall return flow is expected to have minimal effect to fish species within the Henry's Fork Watershed. The watershed is managed primarily as a native fishery and dewatering in the spring and summer is generally believed to be the primary limiting factor for such species in the river (C. Amadio, WGFD, personal communication 2013). As mentioned above, this project could provide opportunities to increase spring and summer flows, which could increase overall native fisheries success and make the upper stretches of the watershed a candidate for additional reintroductions of Colorado Cutthroat Trout. Low flows in the fall may not be beneficial to native fish species, but it is believed that low flows may also protect Henry's Fork from Burbot (Lota lota) invasion (C. Amadio, WGFD, personal communication, 2013).

Water budgets show that the improving irrigation systems will create a net depletion of Colorado River water due to increased forage productivity and associated evapotranspiration. This will create an adverse effect for endangered Colorado River fish (bonytail chub, Colorado pikeminnow, humpback chub, and razorback sucker) downstream; although this net depletion is expected to be small (1,372 acre-feet) project-wide. Consultation with the USFWS on depletions has occurred for this project as outlined in the Colorado River Recovery Program.

A depletion charge of approximately $19.82 will be levied against all new depletions in excess of 100 acre feet. New projects pay 10 percent at the time Federal funds or authorizations are obtained and the remainder will be paid by individual landowners participating in the program prior to depletions occurring. As an example, converting a 100 acre field from flood irrigation to a center pivot sprinkler irrigation system would result in an estimated depletion of approximately 10 acre-feet and a depletion charge of $198.20 (10 ac-ft x $19.82). With 10% of the estimated cumulative depletion of the Henrys Fork Salinity Control Project paid at project authorization, the remaining 90% of the depletion charge to the participating landowner would amount to $178.38 for the 100 acre example described above ($198.20– 10% = $178.38).

If salinity measures reduce or eliminate instream push-up style diversions, it would be beneficial for the fish in the project area due to a reduction in possible movement barriers, erosion and siltation sources, and sources of maintenance-related disturbance. Preliminary estimates are that four such diversions would be replaced throughout the planned project. According to Wetland Hydraulic Engineer, Rich Weber, (Appendix C) these push-up diversions pose a significant impact to the stream's ability to maintain riverine wetland functions by reducing the peak discharge hydrograph, which in turn impacts the sediment cycling functions of the stream, as well as reducing the water surface profile needed to maintain the endosaturated groundwater regime in the floodplain. New diversion structures will be more stable and will reduce the amount of water diverted from the stream while still maintaining stream channel geometry, maintaining sediment transport, and providing better aquatic organism passage. All of these factors lead to possible improvements to the ecological functions of the stream corridors and riverine wetlands.

Floodplain Management

No effects anticipated.

Invasive Species

Implementation of the salinity control projects should beneficially address Invasive Species concerns.

Elimination or replacement of on-farm irrigation ditches with buried pipelines and sprinkler irrigation systems will eliminate ditch banks and other hard-to-access areas that are prone to invasion by weeds and that may be difficult to implement control efforts. Piping will also reduce the transport and spread of weed seeds. Mapping and monitoring of weeds will be easier to conduct in sprinkler irrigated fields than they are when flood irrigated.

Any soil areas disturbed as a result of the project will be seeded and managed to prevent the establishment of noxious weeds. When planting is carried out in conjunction with the planting, all seed used will be certified free of noxious weeds consistent with Wyoming seed law.

Potential voluntary mitigation strategies include grazing and wildlife management, with facilitating practices that reduce degradation of native riparian plant species. Healthy native riparian areas are better able to resist establishment of invasive species. There is also opportunity for pest management practices that would target Salt Cedar, Russian Olive, and other noxious plant infestations in the Henrys Fork watershed. Russian Olive and Salt Cedar are both state designated noxious weeds in Wyoming and field investigations identified a few trees encroaching riparian areas low in the Henrys Fork watershed that have the potential to spread.

Migratory Birds / Bald and Golden Eagle

Neo-tropical migrants will be adversely impacted by the removal of woody vegetation associated with on-farm delivery ditches and possible increases in haying activity. Wet-meadow associated birds will be adversely impacted although their use of the site is minimal at this time due to current management. Impacts to waterfowl are expected to be minimal since most of the impacted wetlands are currently hayed and increases in forage may be beneficial to many of these species.

Much bald eagle use in the proposed project area is documented. No evaluation or inventory for the presence of bald eagle nests, or winter roosts, in the mature cottonwoods along the rivers has been made to assess potential impact. So long as the mature cottonwoods along the rivers are not disturbed, there would be minimal impact to bald eagles.

All construction activities should take place outside the nesting season to avoid disturbance to migratory birds.

Prime and Unique Farmlands

There will be no effect on Prime and Unique Farmlands. According to the “Soil Survey of Henrys Fork Area, Utah-Wyoming – Parts of Daggett and Summit Counties, Utah and Sweetwater and Uinta Counties, Wyoming” published in 1988, there are no prime and unique farmlands as defined by the Natural Resources Conservation Service (NRCS) “National Soil Survey Handbook (NSSH)”, Part 622.04 – Prime Farmland Soils.

Riparian Areas

Weedy, brushy, and treed areas along irrigation ditches, creeks, and rivers provide important cover and roosting habitat for many wildlife species. Such vegetation and habitats associated with on-farm delivery ditches will likely be adversely affected by the proposed salinity controls due to removing them completely or drying them out over time. It may be possible to replace some of these losses through improvements to existing riparian vegetation that increase recruitment of young woody species or remove competition from invasive species. Examples of this mitigation would include voluntary funding incentive programs to manage grazing and wildlife management of riparian areas with facilitating practices, plant native species, and projects to control Russian Olive (Elaeagnus angustifolia) and Salt Cedar (Tamarix spp) encroachment. This invasive species control form of mitigation would likely be restricted to the riparian areas fed by perennial flow, with a general loss of such habitats within the uplands and hay meadows that are now supported by irrigation or on-farm delivery ditch water.

Improvements to existing riparian vegetation that over time have lost understory native woody species and recruitment of young plants have potential to provide mitigating wetland functions through voluntary programs.

Wetlands

The proposed salinity control project could impact up to 5,631 acres of wetland (chart 4). However, almost all of the impacts of the recommended alternative will be to irrigation-induced wetlands or artificial wetlands, which total 2,899 acres of the project area. These are wetlands supported by inefficient irrigation systems and associated supply canals. A considerable amount of naturally occurring wetland associated with the many streams and rivers in the project area, as well as natural fens supported as slope wetlands and receiving water from the Uinta Mountains, exist in the project area as well. Impacts to naturally occurring wetland are expected to be minimal due to program restrictions and a general lack of agricultural productivity, but that depends on the exact location, extent, and kind of salinity control measures installed through the program. In his trip report, Rich Weber, Wetland Hydraulic Engineer, stated that the hydrology of the existing natural fen areas are intact and although some limited enhancement of hydrology may be provided by current irrigation systems, its impact is limited. He further concluded that based on landscape, soil, and hydrologic evidence that wetland hydrology will be maintained on these sites regardless of the irrigation system used in the watershed (Appendix C).

The potential effects to irrigation-induced wetlands were estimated based on the changes in deep percolation and runoff for the proposed project from the water budget. These estimates are based on the assumptions that the water from the irrigation-induced wetlands is supplied from the runoff and deep percolation of the on-farm irrigation systems and seepage from the delivery system. Further, it is assumed that the water is supplied uniformly from these sources and based on the calculations in the above wetland section 2,899 acres of irrigation-induced wetlands exist within the project area. The amount of the deep percolation attributed to the delivery system is 31 percent of the total of the existing deep percolation and runoff. The proposed project will not treat any of the delivery system, so any wetlands associated with the delivery system will have minimal effects from the project. Based on the assumptions above, it is estimated that approximately 899 acres of wetlands can be associated with the delivery system and will not be affected by the project. The water budget determined that the runoff and deep percolation from the on-farm systems will be reduced from 34,281 acre-feet to 18,596 acre-feet or a reduction of 46 percent. It is thus estimated that this reduction in water flow could impact 46 percent of the remaining 2,000 acres of irrigation-induced wetlands or about 800 acres of wetland.

During the field investigation by soil scientists and a wetland hydraulic engineer (Appendix C), it was concluded that the irrigation-induced wetlands exist on “interfluves”. These are areas between active floodplains, and outside of slope wetland landscape positions. While they have the plant and some soil attributes associated with wetlands, they have little potential to provide wetland function. In these positions, the biogeochemical processes, groundwater storage, wildlife habitat, and functions provided are limited. Changing the irrigation regime to eliminate the continuous surface saturation during the meltwater runoff period will return these interfluves areas back to an upland hydrologic regime, but with no significant ecological effect.

In addition to this assessment, an attempt to quantify the wetland functional values at risk of being impacted by this project was completed using the Montana Department of Transportation's "Montana Wetland Assessment Method" (MDOT WAM 2008) as recommended by the USACE. If the project moves forward, this same tool will be used for site-scale analysis and mitigation tracking. The Montana method is not necessarily intended for an evaluation of this size and across this large of a geographic area, but did provide a rough estimate for consideration and mitigation planning. The Montana method is a rapid wetland assessment that calculates wetland values based on their relative importance for threatened and endangered species, state species of concern, general fish and wildlife habitat, flood attenuation, surface water storage, sediment/nutrient/toxicant remediation, shoreline stabilization, groundwater protection, production, uniqueness, and recreation.

A basic assessment of the irrigation-induced wetlands expected to be impacted by the salinity project (800 acres), assuming all to be rather homogenous, determined that the existing irrigation induced wetlands are functioning at 36 percent of possible value with a total of 2,000 functional units (chart 7).

This assessment did not evaluate the ribbons of woody vegetation associated with the on-farm delivery ditches, which would have a higher functional value due to increased structural diversity and wildlife use, but make up a relatively small percentage of the project area. The actual extent of impacts to these woody ribbons is difficult to estimate. In many instances, some level of water flow will be maintained in the on-farm canals to water field edges and livestock, which could maintain the riparian vegetation. In other situations, riparian vegetation may be totally removed to allow the sprinkler irrigation system to fit within the field. Such losses will be quantified on a site-by-site basis and mitigated appropriately. To replace the full functional value (assuming full removal of 800 acres) with wetlands functioning at 60 percent would require 476 acres. These numbers could be increased or decreased based on the actual extent of impacts to wetlands observed and the functional value of the wetlands used for mitigation. This tool provides no guidance for mitigating wetland impacts with non-wetland habitat (out-of-kind mitigation). Such relative value discussions need to occur if there are plans to improve a non-wetland habitat to off-set impacts to wetland areas.

Chart 7. Functions and Values Summary for Impacted Irrigation-Induced Wetlands (800 acres) in the Henrys Fork Project Area[1].

Function and Value Variables	Rating	Functional Points	Points Possible	Functional Units[2]	Four Prominent Functions
Threatened/endangered species	L	0.3	1.0	240	☐
S1, S2, S3 species	L	0.2	1.0	160	☐
Wildlife habitat	M	0.5	1.0	400	☒
Fish habitat	NA				☐
Flood attenuation	NA				☐
Surface water storage	M	0.5	1.0	400	☒
Sediment/nutrient/toxicant	M	0.4	1.0	320	☒
Shoreline stabilization	NA				☐
Production export	L	0.3	1.0	240	☒
Groundwater	NA				☐
Uniqueness	L	0.2	1.0	160	☐
Recreation (bonus points)	M	0.1	NA	80	☐
Totals:		2.5	7.0	2,000	
Score:		36%			

[1]Calculated by the Montana Wetland Assessment Method. The full assessment of impacted irrigation-induced wetlands can be viewed at: http://app.mdt.mt.gov/wetlands/assessment/5cbd7409-d13d-4619-80c7-972fe6ceba76
[2]Functional units = actual points x AA size (2,899 acres).

Wetland Habitat Mitigation

The compensatory value of habitat enhancements is determined based on a comparison between the habitat values that existed prior to the enhancement activities (baseline conditions) and the improved habitat values. The difference in habitat values between baseline and improved is counted towards compensation. Compensatory value also takes into consideration whether enhancements improve habitat values similar to those foregone. In general, there is a preference for "in place and in kind" compensation, unless it is determined that other options are ecologically preferable, more sustainable, and more efficient for long term management. The Montana Wetland Assessment Method will be used for site scale monitoring and mitigation calculations if the project moves forward.

The following considerations will be applied when evaluating potential mitigation opportunities:

(i) Restoration/enhancement of riparian and floodplain areas adjacent to perennial streams and naturally occurring wetland complexes is preferred due to their increased threat and high wildlife habitat value.

(ii) Habitat replacement must be consistent with and enhance local and area-wide resource management plans and agency and public priorities for species and habitat conservation.

(iii) Habitat replacements will be prioritized based on their proximity to an already protected area or their ability to connect protected areas. Establishment of a new, dedicated wildlife area will be considered.

(iv) Habitats and measures to be applied must be sustainable with a minimum requirement for long-term maintenance and remediation.

(v) Monitoring plan to determine how well habitat improvements are compensating for habitat values foregone. However, monitoring, by itself, will not be considered mitigation.

The actual extent of wetland impacts will have to be determined on a field-by-field and site-specific basis if the salinity project is approved. For instance, it is unlikely that full conversion of wetlands will occur.

More likely, the wetland hydrology, size, and thus functional value, will be reduced by irrigation improvements, not eliminated. Smaller-scale analysis is also needed to tease apart the complex hydrology of the region. At the basin scale, it is nearly impossible to determine whether wetland hydrology is currently being supplied by "wild flood" irrigation, on-farm delivery ditch seepage, canal seepage, slope wetlands, other sources, or a combination. It is probable that only after the irrigation improvements occur will we be able to determine conclusively if wetlands were caused by flood irrigation, on-farm delivery ditches, or some other source not affected by the on-farm irrigation improvements. Site specific monitoring and habitat assessment will be evaluated using the Montana Wetland Assessment Method (Berglund and McEldowney 2008), conducted by a trained individual, with the assistance of participating landowners. Once the amount of impact is estimated on a case-by-case basis, specific mitigation alternatives can be developed. However, assuming 800 acres of artificial wetland may be impacted through salinity measures, it is difficult to determine how all these impacts will be fully replaced, although all replacement opportunities are being pursued. Discussions are ongoing regarding on-site, off-site, and out-of-kind replacement possibilities in and around the area, but clearly, replacing such large acreages will be a challenge.

At the present time, 129 acres of on-site replacement has been identified through various practices and additional replacement opportunities are being pursued. Most of the identified replacement possibilities do not involve actual wetland creation or enhancement and thus do not provide as high of replacement value within the MT Wetland Assessment Method (Berglund and McEldowney 2008). For instance, it is believed that we can implement practices to improve riparian vegetation on approximately 90 acres through grazing and wildlife management, with facilitating practices, and remove invasive species on 25 additional acres, which has been identified as a priority by USFWS.

Further, we are currently in the planning stages with Trout Unlimited regarding on-stream improvement projects within the drainage whose value is not well represented by the MT Wetland Assessment Method

(Berglund and McEldowney 2008). As mentioned in the essential fish habitat section above, it is anticipated that we will replace four "push-up" style diversions with more permanent water control structures through this salinity project. Replacement of these earthen diversions has the potential to improve riverine wetland functions along Henrys Fork through improved sediment transport, more stable stream channel geometry, improved aquatic organism passage, and possible increased in-stream flow (Appendix C). We are also exploring the need for fish passage and barrier structures on some of the tributaries to Henry's Fork. However, these functional values are difficult to quantify pre-treatment.

Several efforts are also ongoing in the surrounding upland habitats. However, at the present time, we only anticipate being able to create or enhance wetlands on 14 acres within the project area. Opportunities are currently being explored to secure additional outside funding to provide mitigation on private lands outside the immediate project area and/or on public lands. Opportunities that are being pursued include requesting funding from the Colorado River Salinity Forum to apply towards replacement not eligible under NRCS programs (i.e. public land projects, property purchases, etc.).

Discussions related to possible refuge (e.g. Seedskadee, Flaming Gorge) expansion if outside replacement funds become available have already occurred. We are also working with state wildlife agencies to identify and cost-share nearby habitat improvement projects, cooperating with area non-government organizations (NGO) such as Trout Unlimited and Rocky Mountain Elk Foundation to identify possible replacement projects. Further, we are looking at ways to leverage some of our existing funding with funds from the Wyoming Wildlife and Natural Resource Trust Fund (WWNRT), the Wyoming Landscape Conservation Initiative (WLCI), Wyoming Land Trust, and other smaller funding sources. The quantity and quality of replacement such collaboration will result in is unknown at this time.

The Montana Wetland Assessment Method (Berglund and McEldowney 2008) has been and will continue to be used to evaluate the effectiveness and thus value of replacement measures. Such analysis will be completed by an individual trained in the skills required to understand and populate the assessment. The Montana Wetland Assessment Method was used to determine the relative replacement value of proposed riparian improvements. The large-scale, rough assessment of riparian wetlands (500 acres) in the Henrys Fork area are estimated currently to be functioning at approximately 61 percent of possible, with a total of 3,025 functional units (chart 8). Predicted vegetation and habitat changes associated with grazing and wildlife management, with facilitating practices, would be able to improve wetland function by up to 10 percent based on this model. Treatments of invasive species would improve the wetland function by up to 4 percent. Thus, improving riparian habitat on 90 acres by 10 percent would result in 90 functional points for replacement or 4.5 percent of the 2,000 functional points we expect to lose through this project. Removing invasive species on 25 acres would result in an additional 10 functional points for replacement or 0.5 percent of the 2,000 functional points lost. If the 15 acres of wetland creations or enhancements function at 60 percent, rather than the current 36 percent, they would provide 24 functional points for replacement, or 1.2 percent of the 2,000 functional points lost. In total, the 129 acres of identified replacement opportunities would replace 124 functional points or 6.2 percent of the 2,000 functional points expected to be lost. Other replacement opportunities will be pursued, but at this time, it is anticipated that some of the lost functional value will not be replaced.

Chart 8. Functions and Values Summary for Riparian Wetlands (500 acres) in the Henrys Fork Project Area[1].

Function and Value Variables	Rating	Functional Points	Points Possible	Functional Units[2]	Four Prominent Functions
Threatened/endangered species	M	0.7	1.0	350	☐
S1, S2, S3 species	M	0.7	1.0	350	☐
Wildlife habitat	M	0.5	1.0	250	☒
Fish habitat	M	0.4	1.0	200	☐
Flood attenuation	M	0.4	1.0	200	☐
Surface water storage	H	0.9	1.0	450	☒
Sediment/nutrient/toxicant	M	0.6	1.0	300	☒
Shoreline stabilization	M	0.7	1.0	350	☐
Production export	M	0.7	1.0	350	☒
Groundwater	NA				☐
Uniqueness	M	0.4	1.0	200	☐
Recreation (bonus points)	L	0.05	NA	25	☐
Totals:		6.05	10.0	3,025	
Score:		36%			

[1]Calculated by the Montana Wetland Assessment Method. The full assessment of impacted irrigation-induced wetlands can be viewed at:
http://app.mdt.mt.gov/wetlands/assessment/faecc07f-fa6d-4662-aeca-bd45d743295e
[2]Functional units = actual points x AA size (2,899 acres).

Please refer to the Wetlands Setting, Animals Future with Alternative B (recommended plan), and Federal and State Species of Concern Future with Alternative B (recommended plan) Sections of this document for more information and discussion.

Wild and Scenic Rivers

No designated Wild or Scenic Rivers occur within the project or Henrys Fork watershed area.

Social and Economic Characteristics

Land Use: The land use in the area is not expected to change as a result of Alternative B. No new land will be brought into production. The distribution of the various land uses is not expected to change.

Capital and Labor: The recommended plan will provide money for financial and technical assistance for the improved irrigation systems. The labor base will not be affected.

Management Level: The management level related to the irrigated hayland will be optimized. The labor to manage irrigation water will be reduced appreciably due to the installation of improved irrigation systems.

Profitability: The overall profitability of the project will increase due to the project action. There will be a labor savings on operations implementing irrigation system improvements. Crop production will increase.

In nearly all cases there is sufficient elevation difference to generate enough pressure to operate sprinkler irrigation systems. Therefore, most systems will include a short section of pipeline to gain pressure for these “gravity powered” sprinkler systems. Based on an average federal cost of $1,200 per acre, the cost of salt load reduction will be about $250 per ton, Financial Assistance (FA) plus Technical Account (TA), for on-farm practices.

Economic benefits for landowners converting to sprinkler include increased yields from an average of 1.5 tons per acre of hay to 3.3 tons per acre. Some additional benefits may be realized through reduced labor requirements depending on the system installed.

Economic Analysis

The economic efficiency of the Henrys Fork Salinity Control Project is determined by the fact that more efficient water application has both public and private benefits. Investments in more efficient sprinkler systems reduce the leaching of salt which has defined benefits to downstream users in the Colorado River system. Ranchers are also able to use more efficient irrigation systems to produce a higher quality and increased hay crop than can be grown with ‘wild flood’ techniques. Reductions in operation costs may be experienced depending on the type of system installed. Overall, the average operation costs on new irrigation practices, system-wide, are similar to labor intensive wild flood techniques.

A measurable benefit of salinity projects is the reduction of impacts to downstream users on the Colorado River. The U.S. DOI Bureau of Reclamation has developed a model which calculates damages from a given level of salt at Imperial Dam on the Lower Colorado. These are predominantly damages to agriculture and households. Economic damages were recently estimated at over $350 million dollars or $173 per ton of salt (USDOI, 2011). Salinity projects such as Henrys Fork are therefore estimated to generate downstream benefit according to these calculations.

Agricultural damages make up half of the damage costs (or the benefits of salt savings) and are sensitive to current crop acreage and prices. Higher-valued crops would experience higher impacts from the same salt concentration. Higher flows on the Colorado River may also dilute downstream impacts, whereas low flow years experience higher salt concentrations and higher impacts. The $173/ton BOR calculation used in this analysis of Henrys Fork benefits is the most current published figure available.

Hydrosalinity analysis has estimated that treatment will reduce salt leaching by 0.46 tons per acre over the 14,096 treated acres on the Henrys Fork Project (Whicker, 2010; NRCS, 2012). While not as impressive as some other salinity control projects, these are important watershed improvements with present value benefits. Grass, hay, and aftermath grazing yields are anticipated to rise 119 percent based on a survey of high elevation hay producers conducted by NRCS in 2011.

Public and private irrigation improvements in the Henrys Fork project area are estimated to take place over a 20-year period. Federal financial assistance for conservation measures would be provided primarily by the Environmental Quality Incentives Program (EQIP). An EQIP program payment rate for the implementation of conservation practices was used to analyze Henrys Fork economic benefits. Four different irrigation scenarios will be used to reduce application of irrigation water and improve irrigation timing in the project area. The mix of irrigation treatments, cost, and operational parameters are shown in Chart 9. Pivots, wheel lines, pod lines, and gated pipe will be installed, with an expected practice life span of 15 years. Benefits and costs are assumed to accrue in the project area for 35 years.

Approximately 267 miles of on-farm delivery pipeline (NRCS practice code 430) will be installed to irrigate 14,096 acres. This pipeline will allow most systems to be operated under gravity pressure and with minimal additional pumping costs. Electrical power will be needed to operate drive wheels on center-pivot towers where those systems are installed. In addition, it is assumed that 10 percent of systems are not able to operate on gravity flow due to direct stream diversions or a lack of off-farm delivery to build water pressure. Pumps will be needed in these situations.

For the purpose of total project analysis, costs were categorized into irrigation system improvements (installation) and annual operation costs. Benefits include increased hay production, salinity reduction and operational savings realized when flood irrigation is replaced. All materials, labor and hay prices were assumed to inflate at a 3 percent rate annually. An average regional market quality grass hay value of $100 per ton was used in the analysis.[3] Costs and benefits were adjusted to account for the fact that they occur in different project years. Net present values were calculated using a discount rate of 4 percent.[4]

The value ($173 per ton) of reduced salt in the Colorado was kept constant over the project period. The assumption was that the value of salt reduction may increase or decrease based on many factors in the Colorado River system and as projects come online. Additional empirical evidence from salinity projects will help to inform future studies. Given this uncertainty, no inflation rate was applied to salt benefits in this analysis.

[3] USDA-NASS, average price for grass hay (2006-2010). 2011 Wyoming Agricultural Statistics. $100/ton.
[4] FY 2012 Rate for Federal Water Project Analysis: Section 80(a) 18 CFR 704.39

Chart 9. Summary of Irrigation Practices – Delivery System Installation and Operation Costs.

NRCS Conservation Practice:[1]	Practice Code 442 – Irrigation System, Sprinkler[2]			Practice Code 443 – Irrigation System, Surface and Subsurface	
Activity Type:	**Wheel Line**	**Pod Line**	**Pivot**	**Gated Pipe**	***Total Acres***
Delivery System Installation Costs:					
Total Project Acres Treated (%)	4,934 (35%)	4,934 (35%)	2,819 (20%)	1,409 (10%)	*14,096*
Installation Costs with pipeline and pumps-10% of acres ($/ac)[3]	$ 2,850	$ 1,773	$ 1,503	$ 880	
Average Installation Cost ($/ac): $ 2,007					
Delivery System Operation Costs ($/ac):					***Flood***
Labor at $16/hr[4]	$ 28.00	$ 37.52	$ 0.82	$ 14.00	*$ 28.00*
ATV Gas and Maintenance ($3.10 x hours worked x 80%)[5]	$ 4.90	$ 6.57	$ 0.14	$ 2.45	*$ 4.90*
Pumping on 10% of Acres[6]	$ 2.50	$ 5.00	$ 1.47		
Electric (Pivot Drive)[7]			$ 2.94		
Total Operation Cost	$ 35.40	$ 49.09	$ 5.37	$ 16.45	*$ 32.09*
Average Operation Cost ($/ac/yr): $ 32.29					

[1]Local irrigation practices: Jeff Lewis, District Conservationist, Field Office, Lyman, Wyoming, NRCS Henrys Fork Project Manager (May 2011).
[2]2,000 feet of delivery pipeline per system. 1,000 feet of mainline on wheel and pod systems.
[3]2012 NRCS-Wyoming Practice Payment Schedules.
[4]Mean Wage for Farm workers – Farm and Ranch. SW Wyoming Region Occupational Employment and Wages. Wyoming Department of Employment (September 2011).
[5]GAdapted from: Gentry, Russ. 2005. Operating Costs of ATVs Vary Widely. Ag News and Views - June 2005. The Samuel Roberts Noble Foundation Inc. Ardmore, Okla. 4-year average of 6 models (22-30hp). $3.50/hr for 80% of hours.
[6]Pump Electricity Cost - $1,000/yr/each (on 10% of acres, not gated pipe) 70% load, 90% efficiency.
[7]8 tower side-wiper pivot, 70 days irrigation, with ~1 hp motors at each tower, 28% load factor, 90% efficient and $0.075/kwh.

Results

Net present value (NPV) and benefit-cost ratios were calculated for the total project, for private-only investments, and for federal only, as shown in Chart 10. Private landowners accrue all the benefits of improved hay production but no salinity benefits, since those are off-farm and downstream. All differences in operation costs between flood systems and more efficient irrigation technology accrue as private benefits. With NRCS payment rates, landowners are responsible for 25 percent of the system installation costs. Project area landowner NPV was calculated for the whole project assuming the mix of treatment technologies.

With the only public benefits being salinity reduction, the 'federal only' benefit-cost ratio of this project is less than one. The direct public NRCS cost share to install irrigation systems is over twice the value of the salinity benefits that will accrue as a result of the project. The private benefits of increased hay production are the key to a positive benefit-cost ratio for the combined public and private partnership on Henrys Fork.

Chart 10. Total Project Net Present Values (NPVs).

Henrys Fork 14,096 Treated Acres	**Total Project 2011 Net Present Values (NPVs)**		
35-year project life	Public and Private	Private Only	Federal Only
Delivery System Installation	($ 24,851,431)	($ 6,212,858)	$ (18,638,573)
Delivery System Operation Benefits	$ 105,008	$ 105,008	$0
Increased Hay Production	$ 34,859,042	$ 34,859,042	$ 0
Salinity Reduction Benefit	$ 8,477,270	$ 0	$ 8,477,270
Total NPVs	**$ 18,589,889**	**$ 28,751,192**	**($10,161,303)**
Benefit:Cost Ratio	*1.7:1*	*5.6:1*	*0.45:1*

A simple cash flow analysis was developed for an example landowner who treats 240 acres with wheel lines and pod lines and is an illustration of the financial impact of purchasing irrigation equipment and realizing improved hay production over time. A considerable up-front investment does yield benefits in later years. Chart 11 illustrates that real positive cash flow is realized in the third year of the equipment life. Significant cash flow benefits accrue due to the expectation of higher yields of quality grass hay (+119 percent). The positive tax implications of equipment depreciation were not considered but would cause positive cash flow benefits. It is assumed that landowners will use existing equipment and facilities to harvest hay. If new equipment investments are needed, those costs will reduce positive cash flow.

Chart 11. Landowner Cash Flow Example on 240 Treated Acres.

Example Treatment	**Henrys Fork Landowner Cash Flow Example**[1]	
4 wheel lines and 4 pod lines	240 Acre Total Nominal Landowner Cost	($ 138,695)
NRCS Payment Rate	Landowner $/ac installed (25% of total)	$ 578
	20% Down payment	($ 27,739)
	5 year equipment loan payment at 8%	($ 27,790)
(15-year equipment life)	**Real positive cash flow**	**Year 3**
	Total NPV on 240 acres in 15 years	$ 492,725

[1]Analysis includes the difference in hay/forage enterprise only, on treated acres. Anticipated positive tax implications of equipment depreciation are not considered. Real positive cash flow considers need to replenish landowner cash savings used to cover down payment and negative cash flow in early project years. No new hay equipment purchased.

Conservation measures are likely to increase consumptive use in the project area due to irrigation and crop evaporation increases and phreatophyte use of water. As acres are treated, a one-time depletion charge would occur to landowners and would be less than $2/acre treated. Some of this depletion charge may be covered by program payments. If all 14,096 project area acres are treated, the total charge on 1,372 acre-ft of depletion would not exceed $26,356.

Identification of the Recommended Alternative

Alternative B – Irrigation System Improvements is the recommended plan.

Consultation and Public Participation

The Sweetwater County Conservation District and the Uinta County Conservation District in Wyoming and the Summit County and Daggett County Conservation Districts in Utah all support the proposed Henrys Fork Salinity Control Project. Input was obtained by the use of two public meetings and written comments through the scoping process. The meetings were advertised in the local newspaper and notices posted in various public areas with public access. The proposed project and scoping meeting notice was posted on the Federal Register with the Notice of Intent to develop an Environmental Impact Statement for the project. Landowners in the project area were mailed notices of the project, scoping meeting date/location, comment period and website and phone numbers to obtain additional information.

The private and governmental sectors were represented at these meetings. The private sector was represented by several local landowners/operators.

A number of Cooperating Agency Status entities have provided assistance in the development of this study and document. They are:

- U.S. DOI Bureau of Reclamation
- U.S. DOI Bureau of Land Management
- U.S. Army Corps of Engineers (USACE)
- Wyoming Game and Fish Department (WYG&F)
- Wyoming Department of Environmental Quality
- Wyoming Department of Agriculture
- Wyoming State Historic Preservation Office
- Sweetwater Conservation District
- Daggett County Conservation District
- Uinta County Conservation District

During the planning process, several individuals from the proposed project area were consulted. A list of groups and agencies providing assistance follows:

- U.S. Fish and Wildlife Service (USFWS)
- U.S. Geological Survey (USGS)
- U.S. Environmental Protection Agency (EPA)
- Utah Division of Wildlife Resources
- Utah State Historic Preservation Office
- Wyoming State Engineers Office
- Summit County Conservation District

List of Preparers

The Natural Resources Conservation Service (NRCS) is the lead agency for the Plan and Final Environmental Impact Statement with assistance from the entities listed above.

The following NRCS Agency Personnel assisted with the preparation of this Plan and Final Environmental Impact Statement.

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		• MA Archaeology/Vernacular Architecture	
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Randy Wiggins	State GIS Coordinator	• BS Natural Resource Management	33

Circulation and Distribution List

Copies Available for Review

Copies of the Plan and Final Environmental Impact Statement for the Henrys Fork Salinity Control

Project are available for review at the following locations:

Uinta County Conservation District	USDA-NRCS Field Office
USDA-NRCS Field Office	79 Winston Drive
100 East Sage Street	Suite 110
Lyman, Wyoming	Rock Springs, Wyoming

Notification of Availability / Copies Distributed for Review

Glossary

ACHP: Advisory Council on Historic Preservation – An independent Federal agency that promotes the preservation, enhancement, and productive use of the nation's historic resources.

Alluvium: A general term for all eroded material deposited or in transit by streams, including gravel, sand, silt, clay, and all variations and mixtures of these; unless otherwise noted alluvium is unconsolidated.

Alternative: Options, choices, or courses of action that achieves the objectives of the desired condition or meets a project's purpose and need, including the projected future conditions without the project or action.

Artificial Wetland: A wetland created and supported by an inefficient irrigation system.

Baseline Conditions: Existing and predicted future conditions of a resource about which someone has a concern, such as water, soil, air, or an endangered or threatened species.

CEQ: Council on Environmental Quality – Coordinates Federal environmental efforts and works closely with agencies and in the development of environmental policies and initiatives. CEQ was established within the Executive Office of the President by Congress as part of the National Environmental Policy Act of 1969 (NEPA) and additional responsibilities were provided by the Environmental Quality Improvement Act of 1970.

CEQ Regulations: The regulations that guide federal agencies how to implement NEPA.

CLGs: Certified Local Governments.

Colluvium: A general term applied to loose and incoherent deposits of sediment, usually at the bottom of a low-grade slope or against a barrier on that slope and transported by gravity.

Conservation Practice: A technique or management based on published standards and used to control erosion, conserve water, protect plants, or generally improve soil, water, air, plant, and/or animal resources.

Cumulative Effects: The environmental impact that results from actions, which when added to others of the past, present, and reasonably foreseeable future, will have a total effect (regardless of who or what has caused, is causing, and might cause these effects).

DEQ: Department of Environmental Quality. In Wyoming the DEQ oversees the management of Wyoming's natural environment.

Deep Percolation: Used in this document to describe irrigation water that drains downward through the soil by gravity below the maximum effective depth of the plant root zone and therefore not available to plants.

EA: Environmental Assessment.

EE: Environmental Evaluation.

EIS: Environmental Impact Statement.

EQIP: Environmental Quality Incentives Program – A voluntary program that provides financial and technical assistance to agricultural producers through contracts up to a maximum term of ten years in length. These contracts provide financial assistance to help plan and implement conservation practices that address natural resource concerns and for opportunities to improve soil, water, plant, animal, air and related resources on agricultural land and non-industrial private forestland. It is administered by USDA-NRCS.

Farmland of Statewide Importance: Land, in addition to prime and unique farmlands, that is of statewide importance for the production of food, feed, fiber, forage, and oil seed crops. Farmlands of statewide importance generally include those that are nearly prime farmland and that economically produce high yields of crops when treated and managed according to acceptable farming methods. Some may produce as high a yield as prime farmlands if conditions are favorable.

Fen: Peat-forming wetlands that receive nutrients from sources other than precipitation; usually from upslope sources through drainage from surrounding mineral soils and from groundwater movement.

Federal Financial Assistance: Funds provided to help people reduce soil erosion, enhance water supplies, improve water quality, increase wildlife habitat and reduce damages caused by floods and other natural disasters. Public benefits include enhanced natural resources that help sustain agricultural productivity and environmental quality while supporting continued economic development, recreation, and scenic beauty.

Flood Irrigation: A type of surface irrigation where water is applied and distributed over the soil surface by gravity.

Floodplain: Level land adjacent to a stream or river channel which is covered with water when the channel overflows its banks at flood stages (see "Frequency").

FWOP: Future Without Project – the future without any project action taken.

GGRB: Greater Green River Basin.

Groundwater: Water located beneath the ground surface in soil pore spaces and in the fractures of rock formations.

Hydric Soils: Soil that formed under conditions of saturation, flooding, or ponding long enough during the growing season to develop anaerobic conditions in the upper part.

Hydrophytic Vegetation: Plant life that thrives in water or in wet or saturated soils.

Irrigation System: A system of practices and components that, functioning together, for the application of irrigation water to a designated area.

Irrigation Tailwater: Applied irrigation water that runs off the lower end of a field.

Issue: An environmental resource about which someone has a concern. *Issues* are identified in NEPA § 102(2)(E) as *unresolved conflicts*.

Lithology: The gross physical character of a rock or rock formation. The microscopic study as well as description and classification of rocks.

Natural Areas: Land and water units where natural conditions are maintained. Natural conditions result when ordinary physical and biological processes operate with a minimum of human intervention.

Need: A resource problem or opportunity.

NEPA: National Environmental Policy Act of 1969.

NHPA: National Historic Preservation Act.

NPV: Net Present Value.

NRCS Soil Survey: A NRCS published soil inventory and classification document.

NWI: National Wetland Inventory; developed by USFWS.

Off-farm: A general reference to conservation practices associated with irrigation delivery canal systems.

On-farm: A general reference to conservation practices that are associated within a field or farm as opposed to those related to irrigation delivery canal systems; may include irrigation ditches transporting water from irrigation canals (off-farm) to irrigation systems (flood or sprinkler).

Phreatophytes: A deep-rooted plant that obtains a considerable portion of the water that it needs from the phreatic zone (zone of saturation) or the capillary fringe above the phreatic zone.

Prime Farmland: Land that has the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oil seed crops that is available for these uses. It has the combination of soil properties, growing season, and moisture supply needed to produce sustained high yields of crops in an economic manner if it is treated and managed according to acceptable farming methods. In general, prime farmland has an adequate and dependable water supply from precipitation or irrigation, a favorable temperature and growing season, an acceptable level of acidity or alkalinity, an acceptable content of salt or sodium, and few or no rocks. Its soils are permeable to water and air. Prime farmland is not excessively eroded or saturated with water for long periods of time, and it either does not flood frequently during the growing season or is protected from flooding. (National Soil Survey Handbook; Section 622.04).

Purpose (Objective): A goal to be attained while taking action to meet an underlying need.

Recommended Alternative: The alternative (option/choice/course of action) that the planning team recommends as the best alternative considered in the evaluation and planning process.

Recommended Plan (RP): The plan described in this document recommending the adoption of the recommended alternative.

Salt Budget: A budget attributing quantities of salt from different sources.

Salt Load: The amount of salt in a solution.

Short- and Long-term: Each resource issue requires a specific definition of short- and long-term, which definitions are given in the text. Generally, *short-term* means the duration of the implementation activities plus a few months. *Long-term* means after the short-term.

SHPO: State Historic Preservation Office; responsible for the operation and management of the Office of Historic Preservation as well as long-range preservation planning.

State Historic Preservation Officer: Administer the national historic preservation program at the State level, review National Register of Historic Places nominations, maintain data on historic properties that have been identified but not yet nominated, and consult with Federal agencies during Section 106 review. Designated by the governor of their respective State or territory.

Technical Assistance (TA): Help provided to individuals, groups, and units of government to address opportunities, concerns, and problems related to the use of natural resources (soil, water, air, plant, and animal). TA may include project formulation, planning, application, and maintenance.

Unique Farmland: Land other than prime farmland that is used for the production of specific high value food and fiber crops. It has the special combination of soil quality, location, growing season, and moisture supply needed to economically produce sustained high quality and/or high yields of a specific crop when treated and managed according to acceptable farming methods.

USDA, NRCS: United States Department of Agriculture, Natural Resources Conservation Service.

USFWS: United States Fish and Wildlife Service.

USGS: United States Geological Survey.

Watershed: The area contained within a drainage divide above a specified point on a creek, stream, river, or other water body.

WIRL: Wildlife Inventory Resource Locator; developed by NRCS.

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Appendix A Comments and Responses

Comment Number	Commenter	Comment	Response	Responder
EPA 1	EPA Region 8	Recommend that NRCS create a framework to prioritize potential irrigation projects based on the highest anticipated salinity load reduction while avoiding impacts to high value resources, and include details of the prioritization process in the FEIS.	We will evaluate applications in a similar fashion as previous salinity reduction area applications. They will be evaluated with a screening and ranking process that will take into account cost per ton of salt savings, with the most cost effective applications being selected.	J. Lewis
EPA 2	EPA Region 8	Recommend the individual site evaluations emphasize the identification of "natural" (riverine and fen) wetland resources and avoidance of impacts to the maximum extent possible due to their rare, difficult-to-replace nature, and the critical ecological functions and values they provide to this arid region.	Executive Order 11990 and associated agency policy are part of our individual project scale Environmental Evaluation to prevent impacts to natural wetlands, such as fens. Certified wetland determinations will be completed on any project with the potential to impact a wetland.	B. Jensen
EPA 3	EPA Region 8	Recommend the individual site evaluations apply Executive Order 11990 in accordance with your guidance when assessing and evaluating environmental impacts to natural and artificial wetlands.	Executive Order 11990 and associated agency policy are part of our individual project scale Environmental Evaluation to prevent impacts to natural wetlands, such as fens. Certified wetland determinations will be completed on any project with the potential to impact a wetland.	B. Jensen
EPA 4	EPA Region 8	Recommend the individual site evaluations consider and evaluate a broad range of site-specific designs for on-site improvements (including Best Management Practices for salinity load reduction such as filter strips, cover crops, and residue management, alone or in conjunction with proposed surface irrigation system improvements) for maximum protection and environmental benefit.	Our individual project planning and ranking process presents voluntary program participants with alternatives, including BMP's and encourages participants to adopt such measures.	B. Jensen
EPA 5	EPA Region 8	Recommend the FEIS include any notable information resulting from the collaboration with Trout Unlimited (TU) pertaining to any functional assessments not covered by the Montana Wetland Assessment Method.	This collaboration is just beginning and ongoing. No notable findings have been determined at this time and therefore are not available for inclusion in the FEIS.	B. Jensen

Comment Number	Commenter	Comment	Response	Responder
EPA 6	EPA Region 8	Recommend the FEIS include documentation of USFWS consultations and recommendations pertaining to endangered and threatened species and essential fish habitat due to the projected average annual depletion.	The DEIS was incorrect. The FEIS was edited to show that formal consultation for T&E species is complete and the Biological Opinion is attached.	B. Jensen
EPA 7	EPA Region 8	Recommend continued efforts to identify and expand on mitigation possibilities, including partnering with Wyoming Water Development Office and the Nonpoint Source Program with DEQ on projects outside of the Henrys Fork watershed.	The EIS team continues to engage potential partners for possible replacement opportunities, including those listed. Funding sources for projects not covered by our normal programs continues to be a challenge.	B. Jensen
USFWS-FO 1	U.S. Fish and Wildlife Service - Lander Field Office	Recommend that the Wildlife Resources section be broadened from on-farm irrigation canals to include all fish and wildlife impacts associated with either the loss or degradation of wetland habitats associated with the entire project.	The FEIS was edited to include evaluation of the impacts of the entire project.	B. Jensen
USFWS-FO 2	U.S. Fish and Wildlife Service - Lander Field Office	Recommend the FEIS clarify how the artificial and natural wetland sites were selected and how many sites were actually reviewed to make the determination.	An attempt was made to place at least one sampling point in every questionable wetland within the project area to determine whether it was natural or irrigation induced. However, due to private land accessibility issues, not every site was sampled. A random or other statistically determined methodology was not used. Wetland indicators, such as vegetation and hydrology, were found in almost all landscape positions within the project area. As such, the EIS team used the guidance of the regional supplements to the wetlands delineation manual to use histic epipedon as a primary indicator of natural wetlands due to the time that is typically associated with the development of those soil characteristics.	B. Jensen

Comment Number	Commenter	Comment	Response	Responder
USFWS-FO 3	U.S. Fish and Wildlife Service - Lander Field Office	Recommend the FEIS clarify the impacts to waterfowl; DEIS has impacts to waterfowl misrepresented.	The FEIS was edited to more completely describe rationale. A biologist's tour in 2011 that included USFWS personnel concurred with this finding based on the slope of the wetlands generally causing flowing rather than standing water and constant flooding reducing upland nesting sites. EIS team agrees that irrigation conversion could lead to earlier forage harvest.	B. Jensen
USFWS-FO 4	U.S. Fish and Wildlife Service - Lander Field Office	Recommend the FEIS clarify the ecological value of wetlands, that jurisdictional value is irrelevant, and the need for individual assessment.	Although these irrigation-induced wetlands may be of value to some wildlife, given their landscape position, the only true wetland function they provide is their ability to grow hydrophytic vegetation. The EIS team did attempt to quantify the values of wetlands, both natural and artificial within this document. However, the distinction between the two is important for agency policy (General Manual Title 190 Section 410.26) on wetland replacement. Individual Environmental Evaluations (EEs) and wetland determinations will be conducted to identify possible impacts to wetlands (natural or man-made) on a project by project basis as site specific projects are reviewed.	B. Jensen
USFWS-FO 5	U.S. Fish and Wildlife Service - Lander Field Office	Recommend the FEIS include the potential negative impacts of the project on return flows.	The FEIS was edited to include potential negative impacts to return flows. Although hydrology of the area is difficult to pin-point, we generally agree the project may reduce late season return flows to the river system by a short time given the gravelly nature of the substrate. However, spring and summer flows, not fall flows, are generally believed to be limiting in the Henry's Fork watershed (C. Amadio, WGFD, personal communication) and this project could improve those flows. Diminished fall flows may actually protect the drainage from Burbot invasion.	B. Jensen

Comment Number	Commenter	Comment	Response	Responder
SWCCD1	Sweetwater County Conservation District	Recommend the FEIS explain the reason that only two alternatives are evaluated and why this is sufficient.	The FEIS was edited to explain why two alternatives were evaluated and why that is sufficient.	D. Gaddie
SWCCD 2	Sweetwater County Conservation District	Recommend the FEIS remove the flawed assumption that grazing management in riparian areas will mitigate loss of wetlands.	The EIS team is not implying that riparian improvements are a form of in-kind replacement or mitigation for the wetlands that may be impacted by this project. However, the MT Wetland Assessment Method does provide a functional value for a site. Working with partners, functional values for other out-of-kind habitats (including riparian areas) can be developed.	B. Jensen
SWCCD 3	Sweetwater County Conservation District	Recommend the FEIS remove the flawed assumption that only livestock grazing affects riparian areas, ignoring the significant impacts from other grazing animals.	There is no indication in the Draft or Final EIS that only livestock grazing affects riparian areas. The statement in the Alternative A- No Action/ Future Without Project section that “over time some of these (riparian) areas have lost understory vegetation and recruitment of young native species”, does not infer any potential causes or assign degrees of responsibility. The level of livestock grazing/browsing of riparian areas is not assessed or expressed in the document and is outside the scope of the EIS. Grazing management techniques are identified in the Draft and Final EIS as one of many conservation practices that will collectively provide compensation for habitat values lost through implementation of the project. There is no inference that grazing management techniques imply or advocate livestock exclusion. In order to reduce misconceptions related to conservation practices (along with facilitating practices including off-stream water developments and fencing) that may be used to achieve habitat value compensation, the Final EIS has been amended to include language that includes wildlife habitat management	D. Gaddie

			practices. The phrase "grazing management techniques" now refers to "grazing and wildlife habitat management, with facilitating practices".	
Comment Number	**Commenter**	**Comment**	**Response**	**Responder**
SWCCD 4	Sweetwater County Conservation District	Recommend the FEIS remove reference to the proposed Seedskadee National Wildlife Refuge expansion as planned mitigation for loss of wetlands. The proposed expansion is mostly upland habitat and thus not compensatory mitigation.	The EIS team is trying to identify all replacement opportunities, not just in-kind values, which could involve upland habitats. However, the team currently has no mechanism to fund any expansion of the refuge or habitat improvement to the current refuge and thus, is not actively pursuing that opportunity. It was simply stated as an example of possible replacement opportunities in the larger area.	B. Jensen
USFWS-RO 1	U.S. Fish and Wildlife Service - Regional Office	Recommend the FEIS include updated list of threatened, endangered, proposed, and candidate species.	The FEIS was edited to include the updated the list of threatened, endangered, proposed, and candidate species.	B. Jensen
USFWS-RO 2	U.S. Fish and Wildlife Service - Regional Office	Recommend the FEIS include updated species information and an expanded analysis of project impacts for the yellow-billed cuckoo.	The FEIS was edited to include the updated yellow-billed cuckoo habitat description and to further analyze the potential project impacts to the cuckoo based on habitat needs. If listed, formal consultation with the USFWS will need to occur for this species and project.	B. Jensen
USFWS-RO 3	U.S. Fish and Wildlife Service - Regional Office	Recommend the FEIS include updated information for the interagency consultation completed between USFWS and NRCS for the Colorado River depletions.	The FEIS was edited to reflect the proper consultation status.	B. Jensen
USFWS-RO 4	U.S. Fish and Wildlife Service - Regional Office	Recommend the FEIS include updated depletion charges; the DEIS depletion charge is $19.21 per acre-foot rather than $19.82 per acre-foot in the USFWS Biological Opinion.	The FEIS was edited to reflect the Fiscal Year 2013 depletion charge of $19.82 per acre foot.	D. Gaddie

Comment Number	Commenter	Comment	Response	Responder
USFWS-RO 5	U.S. Fish and Wildlife Service - Regional Office	Recommend the FEIS include updated analysis of fish and wildlife values foregone for all wetland types, as per the Colorado River Basin Salinity Control Act, rather than only those wetlands with hydric soils, based on the definition of a jurisdictional wetland for purposes of section 404 under the Clean Water Act.	Agreed. However, NRCS policy (General Manual Title 190, Section 410.26) for wetland replacement is dependent on whether the wetland is natural or irrigation induced. Through the EIS we have still tried to quantify wildlife values foregone (see sections on animals, endangered and threatened species, essential fish habitat, and wetlands) although firm data is difficult to find for this project area. The team has also tried to identify possible replacement opportunities. Site-scale environmental evaluations (EEs) will more accurately determine these impacts and efforts will be made to replace as much foregone value as possible.	B. Jensen
USFWS-RO 6	U.S. Fish and Wildlife Service - Regional Office	Recommend that NRCS take every reasonable measure to conserve and protect fen wetlands.	NRCS policy (General Manual Title 190, Section 410.26) regarding fen wetlands is nearly identical to that of the USFWS by Executive Order 11990 and thus we are prevented from undertaking any activity that may impact fen wetlands. Our field sampling has identified the fen locations and Rich Weber is confident that the management activities proposed will not impact the groundwater hydrology driving the fens. Individual Environmental Evaluations will identify potential impacts at the project scale.	B. Jensen
USFWS-RO 7	U.S. Fish and Wildlife Service - Regional Office	Recommend that NRCS develop a mitigation bank that could provide a mechanism to meet all mitigation requirements within the project area.	There are currently no mitigation banks recognized by the US Army Corp of Engineers in the state of WY and establishing one is very time consuming, expensive, and generally an activity limited to jurisdictional wetlands and the private sector. We continue to work on establishing consolidated replacement sites for possible impacts of this project, but this is not a true mitigation bank. See 33 CFR part 325 in volume 73, Number 70 (April 2008) of the federal register for further information on mitigation banking.	B. Jensen

Comment Number	Commenter	Comment	Response	Responder
USGS 1	U.S. Geological Survey	Recommend the FEIS include descriptions of irrigation systems used in the study area, descriptions of aquifers tapped, and descriptions of the salinity of the groundwater.	The FEIS was edited to reflect the types of irrigation systems used (center pivots, wheel lines, podlines, and gated pipe). The FEIS was also edited to clarify that only surface water is used for irrigation; no groundwater is used in the proposed Henrys Fork Salinity Control area for irrigation.	J. Lewis
USGS 2	U.S. Geological Survey	Recommend the FEIS include documentation of the sources of salt loading data and any methods used in the analysis of that data.	The FEIS was edited, providing clarification to the section on the USGS Study and the Local Water/Salt Budget stating the salt load was approximately 56 percent of the adjusted mean annual dissolved solids load from the USGS SIR 2010-5048 report.	L. Cornia

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 8
1595 Wynkoop Street
Denver, CO 80202-1129
Phone 800-227-8917
http://www.epa.gov/region08

MAR 04 2013

Ref: 8EPR-N

Astrid Martinez, NRCS State Conservationist
Natural Resources Conservation Service
100 East B Street, 3rd Floor
PO Box 33124
Casper, WY 82602-5011

Re: Henrys Fork Salinity Control
Project Plan and Draft EIS, Irrigation
Improvements, January 2013
CEQ#: 20130002

Dear Ms. Martinez:

The U.S. Environmental Protection Agency Region 8 (EPA) has reviewed the Natural Resources Conservation Service's (NRCS) Draft Environmental Impact Statement (DEIS) for the Henrys Fork Salinity Control Project Plan for Irrigation Improvements. Our review was conducted in accordance with the EPA's responsibilities under section 102 of the National Environmental Policy Act (NEPA), 42 U.S.C. § 4332(2)(c), and Section 309 of the Clean Air Act (CAA), 42 U.S.C. § 7609. Section 309 of the Clean Air Act directs the EPA to review and comment in writing on the environmental impacts of any major federal agency action.

Background

The Henrys Fork project area was identified by the United States Department of Agriculture (USDA) as an area to be studied for possible salinity control and Environmental Quality Incentive Program (EQIP) funding to reduce salt loads entering the Colorado River. The Henrys Fork Watershed Area is located in the northeastern corner of Utah and southwestern corner of Wyoming. The project objective is to reduce salt loading through the Green River to the Colorado River from irrigated agriculture. Based on a 2009 U.S. Geological Survey study, approximately 20,800 tons of salt is delivered to the Colorado River system annually from irrigation activities associated with the Henrys Fork project area.

The DEIS analyzes the No Action alternative (Alternative A) and one action alternative (Alternative B). Alternative B is the recommended plan to implement irrigation system improvements on 14,906 acres through a voluntary process. The DEIS estimates that this alternative will improve irrigation systems on 70 percent of the irrigated acres through conversions of older (flood) surface irrigation systems to side roll, center pivot, and pod sprinkler systems. A limited amount of on-farm delivery dirt ditches transporting irrigation water from the canal to the field will also be considered for improvements by converting them to buried pipe. In addition to reducing salinity from the Henrys Fork area, the improvements will also more efficiently use the 70,790 acre-feet of water currently being utilized for irrigation in the project area.

Lacking field by field on-site wetland determinations, wetland acreages in the project area were estimated based on U.S. Fish and Wildlife Service National Wetland Inventory (NWI) data, NRCS Soil Survey information, analysis of historical photography, and site visits conducted by an interdisciplinary team in 2010. Final estimates of wetland acreage include 2,232 acres of peat or fen wetlands (naturally occurring), 500 acres of wetlands on riverwash (naturally occurring), and 2,899 acres of upland mineral soil wetlands (irrigation induced), for a total of 5,631 acres.

Environmental Considerations

Although the purpose of the project is to improve water quality, the DEIS also discusses possible environmental consequences associated with the project. The EPA supports the salinity objective of the project, understanding that NRCS is exploring opportunities for mitigating potential environmental impacts.

Wetlands

Irrigation-induced wetland acreage is expected to decline by 800 acres as a result of implementing the project plan, which may also affect wetland-dependent species. The DEIS also states that there are possible minor impacts to the naturally occurring wetlands (a total of 2,732 acres) and the remaining 2,199 acres of irrigation-induced wetlands.

1) Project Prioritization

The EPA recommends that NRCS create a framework to prioritize potential irrigation projects based on the highest anticipated salinity load reduction while avoiding impacts to high value resources, and include details of the prioritization process in the Final EIS. At a minimum, this information could be presented similar to the level of detail included in the framework for potential mitigation considerations (see DEIS p. 78). This prioritization process would maximize salinity reduction for the amount of funding available by ensuring the projects with the greatest salinity reduction potential are funded first. We recommend that the priority framework preclude any projects which adversely affect high value wetlands such as the 2,232 acres of peat or fen wetlands in the area.

2) Environmental Evaluations

The EPA supports the proposed approach of conducting an Environmental Evaluation (EE) of each individual project to more accurately assess environmental effects. Several specific recommendations to consider in implementing this EE process include the following:

- In individual site evaluations, emphasize identification of "natural" (riverine and fen) wetland resources and avoidance of impacts to the maximum extent possible due to their rare, difficult-to-replace nature and the critical ecological functions and values they provide to this arid region;

- Apply Executive Order 11990 in accordance with your guidance when assessing and evaluating environmental impacts to natural and artificial wetlands during the EE process; and

- Consider and evaluate a broad range of site-specific designs for on-site improvements (including approved Best Management Practices for salinity load reduction such as filter strips, cover crops, and residue management, alone or in conjunction with proposed surface irrigation system improvements) for maximum protection and environmental benefit.

Additional Information for Final EIS Inclusion

Information has been included in the DEIS that has greatly improved the document, such as the effort to quantify wetland functional values at risk of being impacted by this project utilizing the Montana Wetland Assessment Method. Functional assessments assign functional units to wetland complexes in order to facilitate the replacement of wetland functions and values through mitigation. These category assessments can assist with prioritizing properties for irrigation improvements. This method along with field investigations will provide valuable information for establishing baseline conditions to measure, avoid and minimize potential impacts of the project.

For those areas where functional values are not well represented by the Montana Wetland Assessment Method, NRCS is currently in the planning stages with Trout Unlimited (TU) regarding on-stream improvement projects within the drainage. We encourage NRCS to include any notable information resulting from this collaboration in the Final EIS.

Additionally, the DEIS states that there are potential impacts to endangered and threatened species and essential fish habitat due to the projected average annual net depletions of water from the Upper Colorado River Basin as a result of more efficient irrigation systems. Although exact effects to instream flow are not known at this time, the DEIS projects a depletion of 1,372 acre-feet of water annually. The DEIS further notes that consultation with the USFWS on depletions will be occurring for this project to ensure that the current anticipated levels are not exceeded as outlined in the Colorado River Recovery Program. Documentation of recommendations resulting from USFWS consultations, and where possible a commitment to implementing them, will be a valuable addition to the Final EIS.

Other Considerations

The EPA supports the planning efforts of the NRCS and other cooperating partners to protect the Colorado River resource through the development of this salinity control project. The DEIS describes a number of on-going efforts to identify mitigation and replacement opportunities for wetland functional values potentially lost through irrigation improvements. Given the importance of wetland resources in the arid west, the limited replacement opportunities identified to date are a concern. The EPA encourages continued efforts to identify and expand on mitigation possibilities. Recognizing the limited mitigation opportunities within the Henrys Fork watershed, we encourage efforts to seek partnerships and opportunities outside the basin as well. Two additional potential partnerships to consider (if not already in contact) are the Wyoming Water Development Office and the Nonpoint Source Program with the Wyoming Department of Environmental Quality.

The EPA's Rating

Consistent with Section 309 of the CAA, it is the EPA's responsibility to provide an independent review and evaluation of the potential environmental impacts of this project. Based on the procedures the EPA uses to evaluate the adequacy of the information and the potential environmental impacts of the proposed action, the EPA is rating this DEIS as Environmental Concerns – Adequate Information (EC-1). The "EC" rating indicates that the EPA review has identified environmental impacts that should be avoided in order to fully protect the environment. The "1" rating indicates that the EPA believes the DEIS adequately sets forth the environmental impacts based on the information that is understood at this time, with the request that any new mitigation measures resulting from consultation with TU and/or USFWS will be incorporated into the document if available at the time of the Final EIS. A full description of the EPA's rating system is included as an enclosure.

We appreciate the opportunity to participate in the review of this project, and we're committed to working with you in the coming months. If we may provide further explanation of our comments during this stage of your planning process, please contact me at 303-312-6925, or your staff may contact Melanie Wasco, Lead NEPA Reviewer, at 303-312-6540.

Sincerely,

Suzanne J. Bohan
Director, NEPA Compliance and Review Program
Office of Ecosystems Protection and Remediation

Enclosure: Ratings Criteria

4

United States Department of the Interior
Fish and Wildlife Service
Lander Fish & Wildlife Conservation Office
Partners for Fish and Wildlife Program
170 North First Street
Lander, WY 82520
307/332-8719 Fax 307/332-9857
Internet: mark_j_hogan@fws.gov

To: Astrid Martinez
NRCS State Conservationist

From: Mark Hogan, USFWS PFW Program

Date: March 4, 2013

Subject: DEIS for the Henrys Fork Salinity Control Project / Irrigation Improvements

I appreciate the opportunity to assist the NRCS with pre-EIS comments which will hopefully improve the end product. I will leave the formal consultation to my Cheyenne Ecological Service Office with my comments directed primarily at general wetland habitat and associated fish and wildlife concerns. With the scale of the project, uncertainty of producer participation, and the number of wetland acres potentially impacted it is understandable why the agency is deferring on conducting site specific environmental evaluations to determine mitigation for lost habitat values until the project is in the implementation stage. In the interim, a broad view of impacts is presented in the EIS which should be strengthened at a minimum in these locations.

Page32-33, The way it is presented that wildlife resources will be impact only along on-farm irrigation canals should be broadened to include all fish and wildlife impacts associated with either the loss or degradation of wetland habitats associated with the entire project.

Page 34-36 With the diversity of landscape and wetland habitats present, attempting to classify wetlands either as being artificial or natural using the occurrence of a single indicator, histic epipedons (maximum expression of anearobiosis) is debatable. It is unclear in the EIS how the sites were selected and how many sites were actually reviewed to make the determination. If random sampling was employed provide statistical analysis and results for validation.

Page 72 Inaccurate statement: Impacts to waterfowl are expected to be minimal since most of the impacted wetlands are currently hayed and increase in forage may be beneficial to many of these species. If the area is currently in grass and grass like hay (wetland plants) production, the traditional haying window will most likely be after the primary nesting season in late July making these area attractive for nesting waterfowl. The conversion to sprinkler irrigation may encourage more alfalfa production which would then be hayed earlier having a greater impact on ground nesting birds. Also, quantity of forage produced is generally not a habitat feature that determines waterfowl usage. Shallow water wetlands associated with flood irrigation are important invertebrate production sites for migrating waterfowl which will be lost in the conversion process. The overall wildlife impacts need to be better quantified.

Page 75 Irrigation induced wetlands exist on "interfluves" …have little potential to provide wetland function and have limited biochemical process, groundwater storage, wildlife habitat functions…and therefore no significant ecological effect. This is a debatable point, for example enough biochemical process are present to have wetland soil indicators (reduction, translocation, and/or accumulation of Fe and other reducible elements) present as well as wildlife do not discern between natural and artificial wetlands, use rates are similar as seen in many wildlife studies including Galatowitsch, S., A.G. Van der Valk. 1994. Restoring prairie wetlands: ecological approach, Iowa State University Press, Ames..; Roush D., 1995. Comparison natural, restored and created wetlands. South Dakota State University. In arid state like Wyoming, wetland and riparian habitats comprise little more than 2% of the landscape. However, the majority of Wyoming's wildlife rely on these unique sites for a part or all of their lifecycle. The benefits of wetlands regardless of natural or artificial should be better quantified even at the broadest level of review. What is a jurisdictional wetland has been debated over and over; I don't think the EIS should be tip toeing around agency statutory obligations for wetland habitat protection by trying to make the distinctions between artificial or natural and somehow artificial wetlands have limited value. That is really a case by case call, it would be safer to say, by definition it is or it isn't wetland and here is how we plan on address the loss of wetland values.

Other miscellaneous items to consider: A potential negative impact that I did not see in the evaluation is removing deep percolation and return flows, what impacts would that have on late season stream flows. Also the recognition that the hydrology of floodplain wetlands has been impaired by human influences from dewatering and channel incision reducing the potential for out of bank flows. Often flood irrigation and irrigation return flows help replace these lost hydrology features. Unclear if mitigation is required and/or voluntary with a target of only natural wetland being mitigated. Finally, we fully support efforts to address functional value replacement, transferable between habitat types. Replacement of specific functions may not feasible given the sideboard of the project; emphasis should be placed on long-term system stability both aquatic and terrestrial.

Mark

SWEETWATER COUNTY CONSERVATION DISTRICT

Mary Thoman, Chairman Tom Burris, Vice Chairman Jean Dickinson, Secretary Henry Bliss, Treasurer Bob Slagowski, Member

79 Winston Drive, Suite 110
Rock Springs, Wyoming 82901
Off. (307) 362-3062 ext. 4
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website: http://www.swccd.us
email: admin@swccd.us

March 4, 2013

VIA E-MAIL
Jeff Lewis, District Conservationist jeff.lewis@wy.usda.gov
Natural Resource Conservation Service
100 East Sage Street
Lyman, Wyoming 82937-0370

Re: Comments of Sweetwater County Conservation District on Draft Environmental Impact Statement for Henry's Fork Salinity Control Project Plan

Dear Mr. Lewis:

The Sweetwater County Conservation District (District or SWCCD submits these comments on the Draft Environmental Impact Statement for the Henry's Fork Salinity Control Project (DEIS).

The District supports the treatment of water salinity but strongly recommends revision in the mitigation portion of the DEIS.

1. Range of Alternatives

The DEIS has written an EIS with only two alternatives. While this is consistent with Tenth Circuit case law, *Utah Environmental Congress v. Bosworth*, 421 F.3d 1105, 1118 (10th Cir. 2005) (finding that the Forest Service range of alternatives was sufficient when objectives were to improve forest stands). The DEIS falls within this decision because its objectives are to benefit water quality. The DEIS however needs to explain the reason that only two alternatives are sufficient.

2. "Livestock Grazing Management" Inappropriate to Mitigate Loss of Wetlands

The District assumes that management of grazing in riparian areas will mitigate loss of wetlands. DEIS at 79. This assumption is flawed for several reasons. The character of the man-made wetlands differs from grazed riparian areas and so the presumption of compensatory mitigation is inaccurate.

Second and more importantly, the premise that only livestock grazing affects riparian areas ignores the significant impacts from other grazing animals. The DEIS ignores this entirely thus rendering any assumption of mitigation by better managing riparian areas illusory.

The District recommended that this be changed, so rather than reducing grazing the DEIS proposes to manage riparian areas as mitigation for loss of wetlands. This is really the same unless the mitigation discussed in the DEIS does not include the development of water. Management of riparian areas, especially where there are large populations of big game, generally requires additional sources of water. The omission of water development leaves only one realistic alternative, which is reducing livestock grazing. Because the DEIS ignores the causal factors of big game and wild horse use, it is only a partial discussion. The District again recommends the deletion of this as a mitigation measure.

Because riparian areas includes many areas that are not otherwise wetlands, the DEIS cannot reasonably assume equivalency. The District has long supported better management of riparian areas but this needs to occur in the context of the animals using the area, the source and duration of water flows, and the assurance that livestock grazing can continue.

The DEIS offers little or no information regarding the other grazing animals. This region features deer, antelope, and elk, as well as some wild horses. All use riparian areas and have impacts on vegetation.

3. Expansion of Wildlife Refuges Is Not An Acceptable Mitigation for Loss of Man-Made Wetlands

The DEIS refers to the proposed expansion of the Seedskadee National Wildlife Refuge as mitigation for loss of wetlands. DEIS at 80. This is not accurate. Most if not all of the land being considered for expansion of the refuge consists of high desert uplands and could not be considered for compensatory mitigation to replace wetlands adjacent to open ditches and canals. Indeed the lands that had been withdrawn were originally considered for farming and the Bureau of Reclamation determined that the lands were unsuitable for farming due to insufficient water and soils. The lands proposed for the two refuges are not wetlands in any accurate sense of the word.

The local governments are strongly opposed to the proposed refuge expansions and have expressed their opposition at every opportunity. The inclusion of the expansion as mitigation contradicts the principles of compensatory mitigation and conflicts with local government plans and policies. It should be deleted.

Thank you for the chance to comment.

Sincerely,

/s/ Mary Thoman

Mary Thoman, Chairman
Sweetwater County Conservation District

United States Department of the Interior

OFFICE OF THE SECRETARY
Office of Environmental Policy and Compliance
Denver Federal Center, Building 67, Room 118
Post Office Box 25007 (D-108)
Denver, Colorado 80225-0007

TAKE PRIDE IN AMERICA

March 7, 2013

IN REPLY REFER TO
9043.1
ER 13/40

Astrid Martinez
NRCS State Conservationist
100 East B Street, 3rd Floor
PO Box 33124
Casper, WY 82602-5011

RE: Draft Environmental Impact Statement (DEIS), Natural Resource Conservation Service (NRCS), Henrys Fork Salinity Control Project Plan, Irrigation Improvements, Sweetwater and Uinta Counties, Wyoming, and Daggett and Summit Counties, Utah

Dear Ms. Martinez:

The Department of the Interior has reviewed the subject draft environmental document. The U.S. Fish and Wildlife Service (USFWS), U.S. Geological Survey (USGS), and U.S. Bureau of Reclamation provide the following comments for your consideration.

COMMENTS OF THE U.S. FISH AND WILDLIFE SERVICE (USFWS)

The USFWS recommends that NRCS update the list of threatened, endangered, proposed and candidate species in the DEIS. Any additions to the list of species or designated critical habitats should then be analyzed in the EIS. The USFWS has transitioned to a new online system to deliver species lists: the *Information, Planning, and Conservation* (IPaC) system. The current list of endangered, threatened, proposed, and candidate species, and designated and proposed critical habitat that may be affected by activities associated with the proposed project are available through this system at http://ecos.fws.gov/ipac/.

The yellow-billed cuckoo is a candidate species for listing. As part of a court-approved settlement, the USFWS has committed to publish certain Endangered Species Act listing actions (i.e., petition findings, listing determinations, and critical habitat designations) according to a Listing Work Plan for Fiscal Years 2013-2018[1]. While the work plan is subject to revision due to unexpected work demands or changes in the availability of funds or staffing, we intend to publish a listing determination for the yellow-billed cuckoo during fiscal year 2013. The listing determination could include a proposal to list the species and designate critical habitat, or the listing determination could include removal of the species from the candidate list. The DEIS

[1] http://www.fws.gov/endangered/improving_ESA/listing_workplan_FY13-18.html

Ms. Astrid Martinez 2

contains little information about the yellow-billed cuckoo and has a description of the species' preferred habitat that is inaccurate. Regardless of the USFWS' listing decision, we recommend that NRCS complete the analysis impacts of the project to the yellow-billed cuckoo, because the species occurs in the project area and is a species of concern for both Utah and Wyoming. We recommend the EIS include updated species information and an expanded analysis of project impacts.

At page 66, the DEIS incorrectly states that interagency consultation under section 7 of the Endangered Species Act has not occurred for Colorado River depletions. This should be updated to reflect the current consultation status: The USFWS has completed formal consultation with NRCS for the Colorado River depletions and issued a final biological opinion dated December 5, 2012. Selected information from the final biological opinion about species' status, analysis of project-related impacts, effects determinations and conservation measures, could be included in the EIS. (For example, the depletion charge is $19.82 per acre-foot rather than $19.21 per acre-foot in the DEIS at page 70).

The Colorado River Basin Salinity Control Act (43 U.S.C. 1571-1599) authorized the Salinity Control Program and directed the Secretary of the Interior to replace incidental fish and wildlife values foregone as a result of implementation of salinity control projects. We recommend the analysis of fish and wildlife values foregone include all wetland types. According to the National Wetland Inventory (NWI), approximately 15,000 of the 20,709 irrigated acres in the project area are wetlands. The DEIS (pp. 34-35) limits the analysis of wetlands to only those acres with hydric soils, based on the definition of a jurisdictional wetland for purposes of section 404 under the Clean Water Act (59 FR 2920; January 19, 1994). But, although the strict definition of jurisdictional wetlands, or "Waters of the U.S. (WUS)," is an important consideration for dredge and fill permitting decisions, the salinity control project is not a Section 404 permitting activity. The 404(b)1 definition does not represent an evaluation of fish and wildlife habitat values foregone as a result of this project. The Final EIS should evaluate impacts to all fish and wildlife habitats, including all wetlands regardless of status under 404(b)1.

At page 36 in Chart 4, the DEIS lists 2,232 peat or fen wetlands in the affected project area. At page 48, a table lists possible minor impacts to the naturally occurring wetlands, and at page 74 the DEIS states that Rich Weber, Wetland Hydraulic Engineer, stated that hydrology of fen areas are intact and that some limited enhancement of hydrology may be provided by current irrigation systems.

Fens are generally described as a type of wetland with organic soil (i.e., peat or muck) and hydrology that is groundwater driven. Fens can take thousands of years to develop and thus are essentially irreplaceable. Due to their unique physical and biological characteristics, fens are designated as a Resource Category 1 under the USFWS Mitigation Policy, or in other words, a habitat that is unique and irreplaceable. The management goal for resources designated as Resource Category 1 resources is no loss of existing habitat value. We therefore recommend that NRCS take every reasonable measure to conserve and protect fen wetlands. This may include mapping the fens in the project area. The USFWS' fen policy, which explains the various types of fens, scientific justification for special consideration, and literature references is available online at http://www.fws.gov/mountain-prairie/es/fen."

The USFWS also strongly encourages the NRCS to consider the use and development of a mitigation bank, which could provide a mechanism to meet all mitigation requirements within

Ms. Astrid Martinez 3

the project area. The U.S. ACOE and the EPA Final Rule on Compensatory Mitigation recognize banks as a preferred mechanism. Appropriate mitigation measures should be identified and negotiated.

If you have any questions regarding the USFWS comments, please contact Nathan Darnall in USFWS' Ecological Services Field Office located in Cheyenne, Wyoming, at telephone (307) 772-2374, extension 246 or at nathan_darnall@fws.gov.

COMMENTS OF THE U.S. GEOLOGICAL SURVEY (USGS)

General Comment: The document does not include a description of the irrigation systems used in the study area. It is also unclear about groundwater use; if groundwater was used as irrigation water, we suggest the Final EIS include a description of aquifers tapped and the salinity of the groundwater.

Chart 5: The document does not include the source of the salt loading information. It could be inferred that the data are from USGS, SIR 2010-5048; however, the reviewers were unable to document that the salt loading data are from the USGS report. We suggest that the Final EIS include documentation of the sources of the salt loading data, and any methods used in the analysis of that data.

Pg. 38: The document indicates that the average annual salt load value of 20,800 tons is from USGS, SIR 2010-5048; however, the reviewers were unable to find this value in the USGS report. We suggest that the Final EIS include a full description of the source of this value.

If you have any questions concerning the USGS comments, please contact Gary LeCain, USGS Coordinator for Environmental Document Reviews, at (303) 236-1475 or at gdlecain@usgs.gov

COMMENTS OF THE U.S. BUREAU OF RECLAMATION (Reclamation)

The document contains no analysis of impacts from the potential off-farm portions of this project, and thus is not adequate to support Reclamation decisionmaking. Accordingly, additional NEPA analysis will be required prior to implementation of any off-farm projects requiring Reclamation's approval.

If you have any questions concerning Reclamation's comments, please contact Jeffrey D'Agostino, Provo Area Office Environmental Group Chief, at (801) 379-1161 or jdagostino@usbr.gov

Sincerely,

Robert F. Stewart

Robert F. Stewart
Regional Environmental Officer

cc: Don Gaddie
Jenny Castagno

Appendix B Support Maps

HF Project Area Map

HF Project Area General Ownership Map

HF Project Area General Soils Map

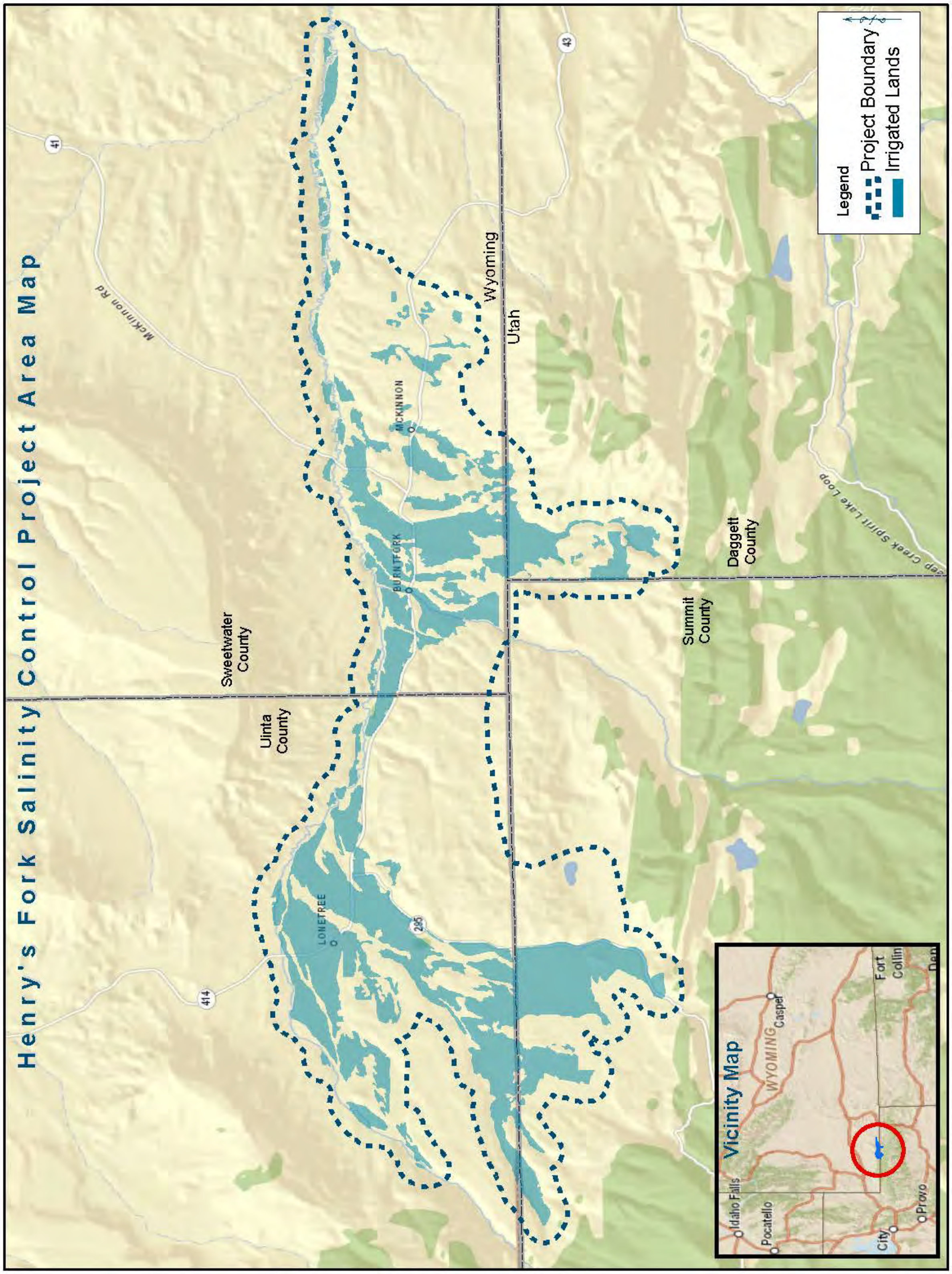
HF Project Area Hydric Soils Map

HF Project Area Topology Map

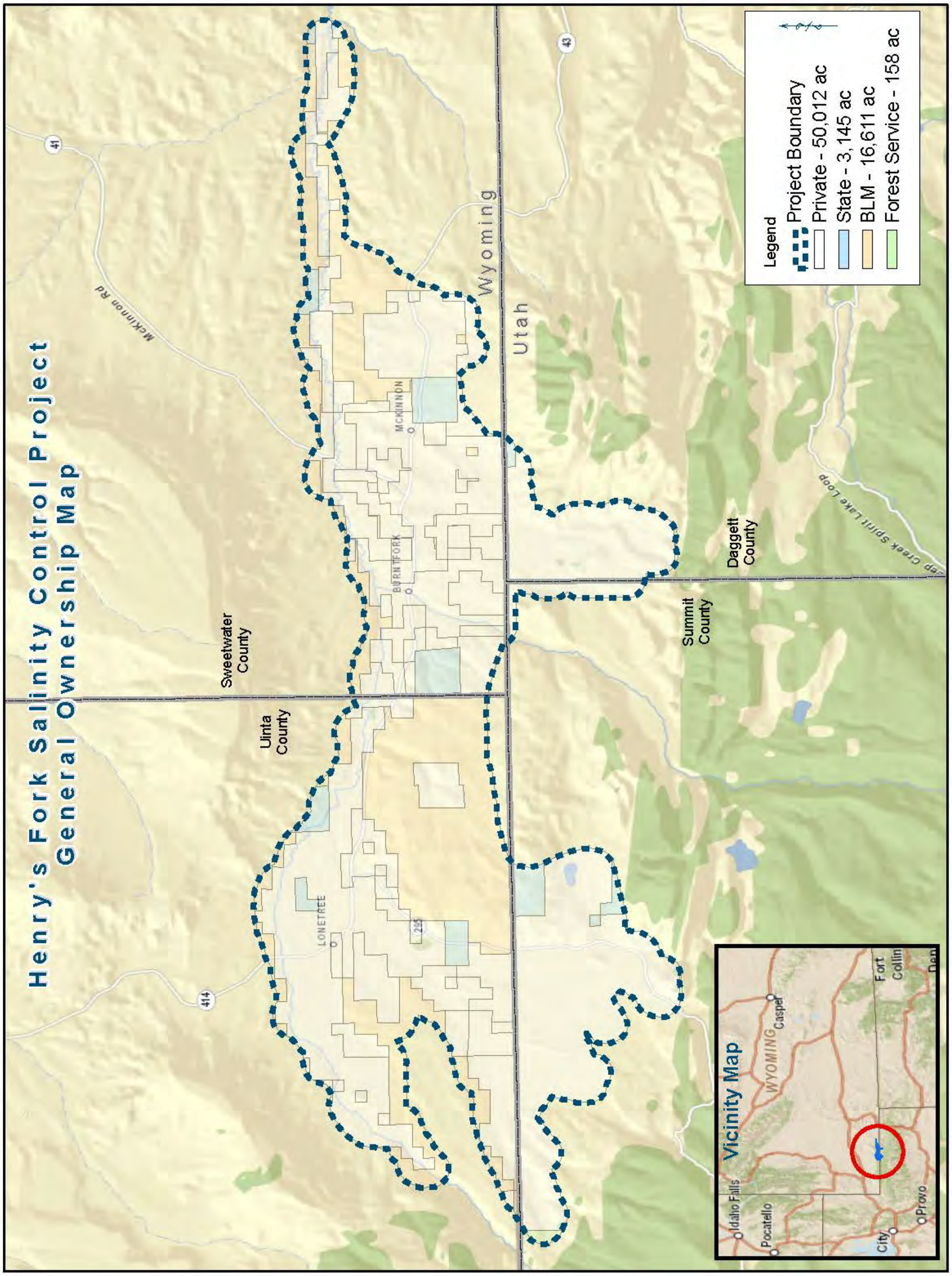
HF Project Area Bedrock Geology Map

HF Project Area Drainage Map

HF Project Area Map

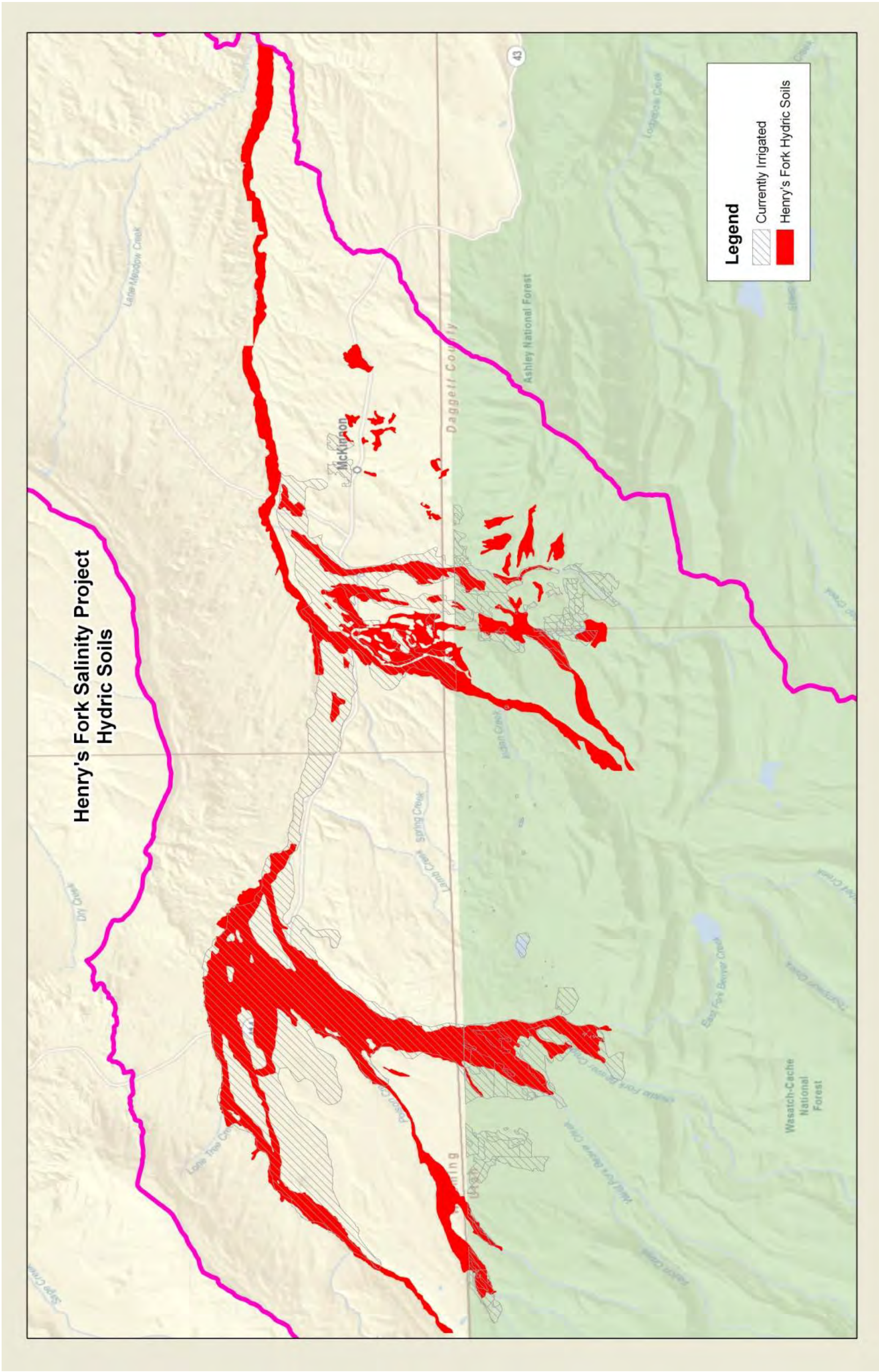


HF Project Area General Ownership Map

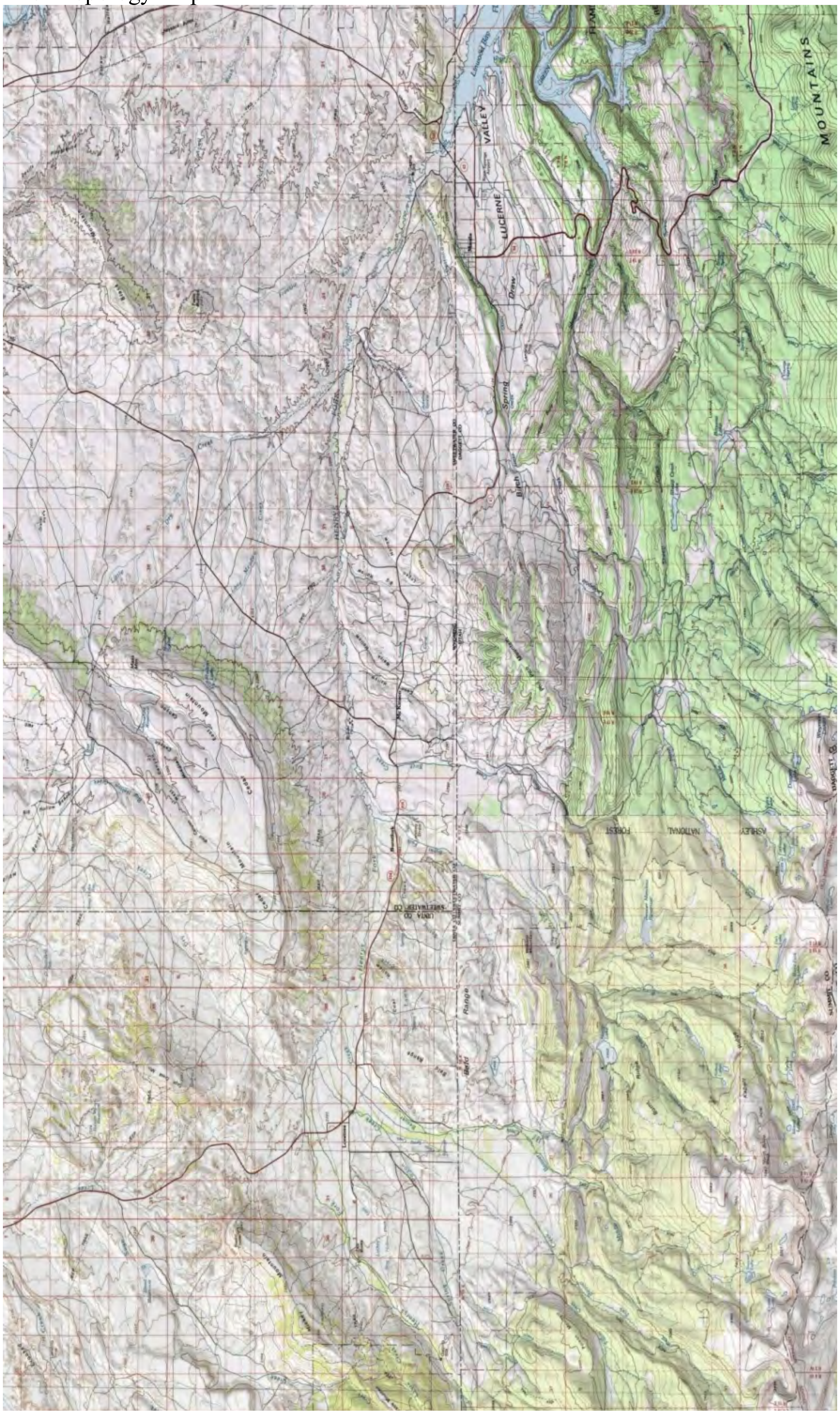


HF Project Area General Soils Map

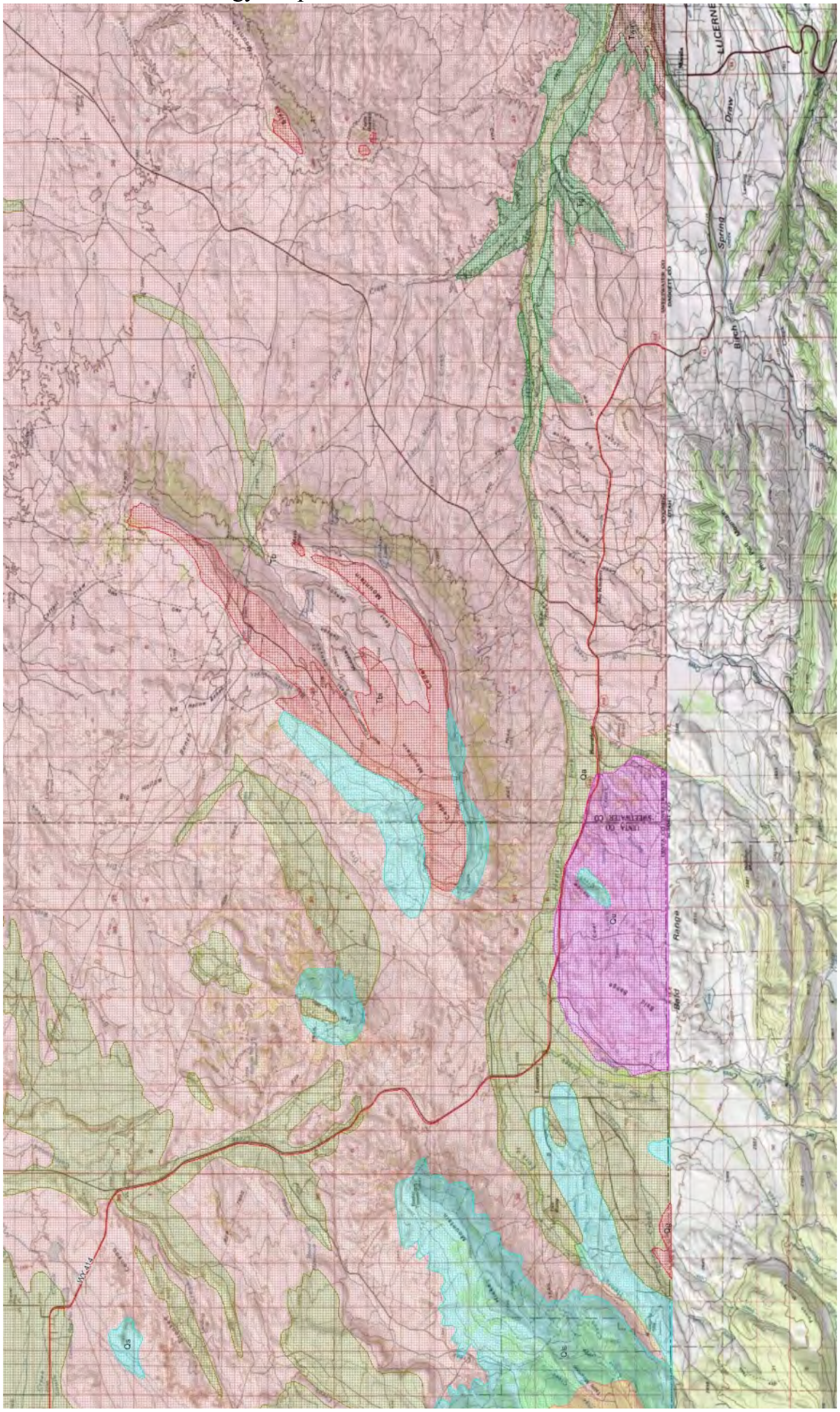
HF Project Area Hydric Soils Map



HF Project Area Topology Map



HF Project Area Bedrock Geology Map



Reddish Orange – Bridger formation
Khaki – Alluvium and colluvium
Green – Green River formation: Laney member
Blue – Landslide deposits
Red – Undivided surficial deposits

HF Project Area Drainage Map

Appendix C Supporting Documentation

NRCS Wetland Technology Development Team Trip Report (9/30/2010)

Advisory Council on Historic Preservation Letter of Consultation (9/11/2012)

NRCS Letter of Request for Consultation with Utah State Historic Preservation Office (2/16/2012)

NRCS Letter of Request for Consultation with Wyoming State Historic Preservation Office (2/16/2012)

NRCS Letter of Request for Consultation with the Northern Arapaho Tribal Chair (2/8/2012)

NRCS Letter of Request for Consultation with the Northern Arapaho Tribal Historic Preservation Office (2/8/2012)

NRCS Letter of Request for Consultation with the Eastern Shoshone Tribal Chair (2/8/2012)

NRCS Letter of Request for Consultation with the Eastern Shoshone Tribal Historic Preservation Office (2/8/2012)

NRCS Letter of Request for Consultation with the Shoshone-Bannock Tribal Chair (2/8/2012)

NRCS Letter of Request for Consultation with the Shoshone-Bannock Tribal Historic Preservation Office (2/6/2012)

NRCS Letter of Request for Consultation with the Northern Ute Tribal Chair (2/8/2012)

NRCS Letter of Request for Consultation with the Northern Ute Tribal Historic Preservation Office (2/8/2012)

NRCS Letter of Request for Consultation with the Summit County Certified Local Government (2/8/2012)

NRCS Letter of Request for Consultation with the Green River Historic Preservation Commission (2/8/2012)

United States Department of Agriculture

NRCS

Natural Resources Conservation Service
Central National Technology Support Center
501 West Felix Street, Bldg. 23
Fort Worth, Texas 76115
Phone: 817-509-3328
Facsimile: 817-509-3336

SUBJECT:	ENG – Hydrology – Trip Report – Review of Fen Wetlands in Henry's Fork Watershed in Wyoming and Utah	DATE:	September 30, 2010
TO:	J. Xavier Montoya, State Conservationist, NRCS, Casper, Wyoming	FILE CODE:	210-18

Participants

Cameron Clark, Supervisory Soil Scientist, NRCS, Saratoga, Wyoming
Jeff Lewis, District Conservationist, NRCS, Lyman, Wyoming
Astrid Martinez, State Soil Scientist, NRCS, Casper, Wyoming
Jay Mar, Assistant State Conservationist (Programs), NRCS, Casper, Wyoming
Paul Obert, State Wildlife Biologist, NRCS, Casper, Wyoming
Richard Weber, Wetland Hydraulic Engineer, Wetland Technology Development Team, CNTSC, NRCS, Fort Worth, Texas

Background

In response for your request for assistance from the Wetland Technology Development Team of the Central National Technology Support Center (CNTSC), on Sunday, September 19, 2010, I traveled to Casper, Wyoming. On Monday, September 20, I was met by Paul Obert, Astrid Martinez, and Jay Mar. Mr. Obert supplied me with maps and other data from the Henry's Fork watershed area. Then, Mr. Mar and I traveled to Mountain View, Wyoming. On Tuesday, September 21, 2010, we were met by Jeff Lewis to begin reviewing site locations in Henry's Fork Watershed. At noon, we were joined by Cameron Clark.

Purpose

The purpose of the trip was to assess the extent of natural wetlands in the proposed Colorado Salinity Control Project in the Henry's Fork Watershed, the potential ecological functions of these wetlands, and the impact that salinity control measures may have on these wetlands. In addition, the review included the evaluation of potential artificial wetlands created by historic irrigation practices, and the potential impact on these areas. The evaluations were conducted to provide input for a pending Environmental Evaluation for the project.

The sites evaluated were in close proximity to sites previously reviewed (June 2010), in detail, by NRCS Wyoming State and field staff. This earlier review focused on detailed soil profile logging in sites that had been historically irrigated in the Henry's Fork, and/or were in especially wet sites that may have been historic wetlands.

Helping People Help the Land

Site Overview

The irrigated areas and the areas with potential natural wetlands exist adjacent to the main stream corridor of Henry's Fork, and tributary stream corridors that drain the north slope of the Uinta Mountains. Most of these lands are on the south side of the valley, and Henry's Fork is situated adjacent to the north margin of the valley. Thus, the plentiful water supply delivered by the Uinta snowpack is only available to the south side of the valley. The low hills to the north side receive little precipitation, and deliver very little water. The moisture from the snowpack is delivered to the stream network during an extended melt period from late May thru early July, and moves downhill as surface runoff, and groundwater. The surface water has been historically diverted to irrigate meadows for haying and grazing by installing "push up" dams in the tributary streams. There are only two reservoirs available for storage of this melt water, and these have limited capacity. For all practical purposes, the irrigation water is only available when the stream hydrographs are high during the melt period. After this ceases, the groundwater moves downward through the system, with a near continuous duration.

There are two wetland types in the watershed as defined by the Hydrogeomorphic (HGM) Classification System. These are RIVERINE, which exist in the active floodplains of the streams, and SLOPE wetlands, which are fed by the groundwater supply. The RIVERINE wetlands are endosaturated by the local alluvial groundwater table, and have a hydroperiod that is dependent on the stream hydrograph during high flows. The stream water surface profile supports this high groundwater level, which rises and falls with the meltwater flows. Thus, their hydroperiod is limited to May through early July. The SLOPE wetlands; however, exist outside of active stream corridors. They are also endosaturated, but are supplied by groundwater which is associated with the broader regional water table. Classic SLOPE wetlands have a surface saturation which is near continuous, and are characterized by soils that are either Histosols or have a histic epipedon. They exist as topographic SLOPE wetlands at the extreme headwaters of streams, or at the toe positions of slopes. They also exist as stratigraphic SLOPE wetlands, where an aquaclude intercepts groundwater and forces it to the surface.

The two wetland types can be distinguished, therefore, by differences in landscape positions (uplands vs. floodplains), by hydroperiod (runoff period vs. continuous saturation), and by soils (histic epipedons vs. mineral surfaces in alluvial deposits). The SLOPE wetland types are often referred to as "fens." The field review found several areas which meet the landscape position, hydroperiod, soil, and hydrologic definition for fen wetlands. In fact, these wetlands are quite common and extensive in the Henry's fork watershed. The site visits were conducted in late September, which is nearing the driest part of the annual hydrologic cycle. Even at this time, these sites had surface saturation, outflow, and even evidence of positive hydraulic head.

Irrigation Water Delivery and Fen Hydrology

The main issue pertaining to the salinity control project concerns the effect how a change in water delivery methods will affect existing wetland hydrology on the natural wetlands, whether there are artificial wetland areas outside of these fen sites created by historic irrigation, and the effects on these areas as well. The irrigation method currently practiced is referred to as "wild flooding," where available water from streams is diverted across meadows continuously throughout the season until the meltwater runoff period ceases. These meadow areas in Henry's

Fork watershed commonly have hydrophytic vegetation. However, there are several characteristics that distinguish the non-fen areas from the natural-fen wetlands:

1. The non-wetland areas exit outside of the concave topographic or toe slope landscape positions.

2. The non-wetland areas had no high groundwater table outside the meltwater runoff period.

3. The organic matter on the surface was not deep enough to meet the histic epipedon depth required to classify the soil as hydric.

The presence of hydrophytes is consistent with the duration of irrigation, which is for the majority of the growing season. It is quite possible that the irrigation regime could build up an organic matter depth greater than that which existed before irrigation. However, without the hydrologic factors that exist in the true fens, this organic layer can provide few of the ecological functions provided in the natural fen sites.

It is impossible to determine the total impacts of the current irrigation regime on the hydrology of the natural fen areas. It is quite possible that irrigation is enhancing the hydrology of these fens to some extent. However, it appears that this potential enhancement is limited for the following reasons:

1. The extent of the hydric soil, surface saturation, and landscape position boundaries at all fen sites (reviewed in late September) are mutually consistent with the definition of the SLOPE fen wetland type. In other words, the required hydrology to maintain the fens is present well past the irrigation season.

2. Sites that can be considered "reference sites" were investigated. They were chosen to represent areas that obviously had limited or no potential to be effected by irrigation delivery. The hydrology and soil indicators at these sites were the same as on fens that were obviously receiving irrigation water. These reference sites were found to have no other water supply than that supplied from groundwater flows from non-irrigation sources.

The following locations were examined. Their designation is based on the map supplied by Paul Obert.

Near Site S7. Figure 1 is a photo of this site location.

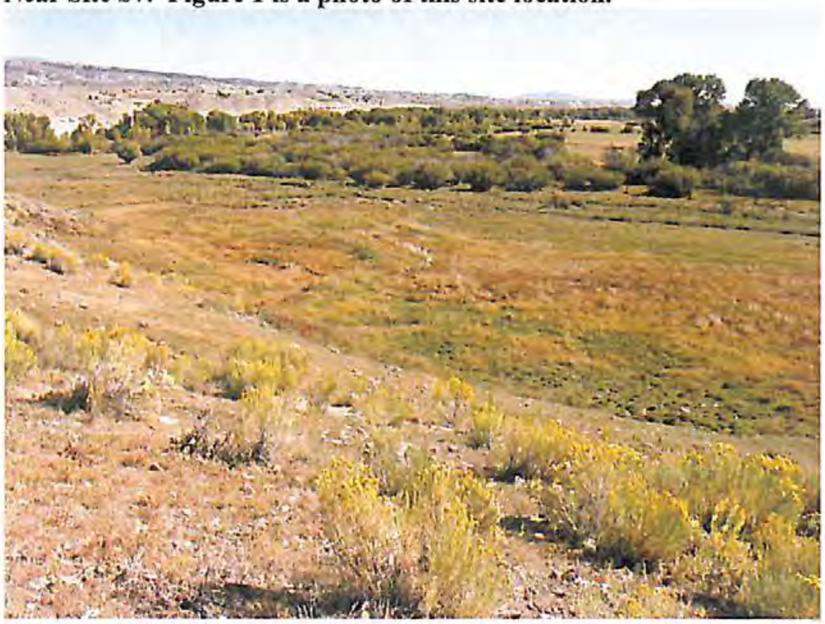


Figure 1 – Site S7.

A series of bore holes across a transect were dug at this site location. The water levels were lower than the free water surface in the nearby Burnt Fork watercourse. However, a bore hole immediately adjacent to an irrigation ditch diverted from Burnt Fork was dug to a level below the water levels in the fen area. The bore hole was dry. This evidence verifies that the water source for the fen area is groundwater from the upland in the foreground. The landscape position, the fact that surface saturation exists during the dry part of the year, and the groundwater source determines that this wetland is a SLOPE wetland, or fen.

First "Check Site" West of Site S7. This site is shown in Figure 2.

Figure 2 – First "Check Site" West of S7.

This site was unique in that the recently harvested hay meadow was currently being supplied with water, and was wet enough to preclude vehicle traffic. The large un-cut meadow in the middle ground of the photo had not been harvested. The upland to the south had ditches at two separate levels, both of which had flowing water. A careful reconnaissance found that the water in the ditches was coming from several distinct discharges from fractured limestone ledges in the cut banks, and no water was being supplied from the Burnt Fork valley. For this reason, the water supplied to the meadow was continuous, and could not be "turned off" by the irrigator. The ditches also allowed the landowner to supply some of this water to drier portions of the ranch. As in the previous site, there was no other source of water than groundwater discharge, and the landscape position is consistent with a fen. Cameron Clark investigated the soil in the fen area, and verified that the depth of the histic epipedon met hydric soil criteria.

Second "Check Site" West of S7. This site is shown in Figure 3.

Figure 3 – Second "Check Site" West of S7.

This site is in another part of the same hydrologic system as the first "Check Site." It is surrounded by recently harvested meadow, which was dry at the surface. The area in the foreground had saturation to the surface. Bore holes were dug in this area, and in the higher, drier area outside the area. The soil in the saturated area had a histic epipedon which met hydric soil criteria, and the soil in the higher area did not. The hydrologic and soil wetland indicators are consistent, and the landscape position and water source meets the definition of a fen.

Sites In and Around U1. An area adjacent to site U1 is shown in Figure 4.

Figure 4 – Location Near Site U1.

Site U1 is located in a series of interconnected fens which start in a headwaters, or topographic slope landscape position, and appear and disappear intermittently as groundwater makes its way to the Beaver Creek valley, where a very large fen exists on the first terrace above the active floodplain. The photo shows surface water flowing out of one of these areas. Again, the landscape, water source, and soil evidence indicate that this location is a fen.

Potential Impacts to Functions of Artificial Wetland Areas

The meadow areas with hydrophytic vegetation and limited organic material accumulation all exist on "interfluves." These are areas between active floodplains, and outside of SLOPE wetland landscape positions. While they have the plant and some soil attributes associated with wetlands, they have little potential to provide wetland function. In these positions, the biogeochemical processes, groundwater storage, wildlife habitat, and functions provided are limited. The natural fen sites, however, provide a high level of wetland function. Changing the irrigation regime to eliminate the continuous surface saturation during the meltwater runoff period will return these interfluves areas back to an upland hydrologic regime, but with no significant ecological effect. However, the project has the potential to benefit other ecological functions within the project area, as will be detailed later in the Other Considerations section. A typical interfluves site is shown in Figure 5.

Figure 5 – Hydrophytic Vegetation in a non-wetland on an Interfluve.

Potential Impacts the Functions of Natural Fen Wetland Areas

As stated earlier, the hydrology of the existing natural fen areas is intact. While some limited enhancement of hydrology may be provided by the current irrigation system, its impact is limited. Based on the landscape, soil, and hydrologic evidence, wetland hydrology will be maintained on these sites regardless of the irrigation system used in the watershed.

Other Considerations

The irrigation practices currently utilized require the installation and maintenance of "push up" diversions on the stream channels, as shown in the photo on Figure 6.

Figure 6 – Typical "Push Up" Irrigation Diversion Dam.

These diversions are maintained on an annual basis with considerable disturbance to the channels. They are also incapable of passing sediment, and create barriers to the longitudinal connectivity of the system for aquatic organism passage and other functions. In addition, the stream flows are diverted onto adjacent stream terraces to the maximum extent, with a significant impact to the stream's ability to maintain RIVERINE wetland functions. The reduction of peak discharge hydrographs impacts the sediment cycling functions of the stream, as well as reducing the water surface profile needed to maintain the endosaturated groundwater regime in the floodplain. The proposed project will create the need to install diversions capable of providing water to the inlet of pipeline networks supplying sprinkler irrigation systems. These structures must be stable and permanent. Several structural techniques are available which can maintain stream channel geometry, maintain sediment transport, and provide aquatic organism passage. If these techniques are used as part of the project, they can greatly improve the ecological functions of the stream corridors.

In addition, conversion to this delivery system will negate the need to divert the majority of stream flows out of the stream corridor through ditches. The water diverted will be only that needed to provide individual sprinkler systems, which will increase the in-stream flows, with an increase in stream corridor functions. In short, this project will maintain the water supply to the fen wetlands, and has the potential to increase the hydrologic functions for the RIVERINE wetlands.

Please contact us again for any further assistance needed on this or future projects.

Richard A. Weber

RICHARD A. WEBER
Wetland Hydraulic Engineer

Concurred:

Norman C. Melvin

NORMAN C. MELVIN, Ph.D.
Leader, Wetland Technology Development Team

Ronald C. Williams

RONALD C. WILLIAMS
Director

cc:
Bruce Newton, Director, WNTSC, NRCS, Portland, Oregon
Cameron Clark, Supervisory Soil Scientist, NRCS, Saratoga, Wyoming
Jeff Lewis, District Conservationist, NRCS, Lyman, Wyoming
Astrid Martinez, State Soil Scientist, NRCS, Casper, Wyoming
Jay Mar, Assistant State Conservationist (Programs), NRCS, Casper, Wyoming
Paul Obert, State Wildlife Biologist, NRCS, Casper, Wyoming
Meg Bishop, Ecologist, WNTSC, NRCS, Portland, Oregon

Preserving America's Heritage

September 11, 2012

Chuck Carrig
State Cultural Resources Specialist
Natural Resources Conservation Service
100 East B Street, Room 3001
P.O. Box 33124
Casper, WY 82602

Ref: *Proposed Henry's Fork Salinity Project*
Sweetwater and Uinta Counties, Wyoming, and Daggett and Summit Counties, Utah

Dear Mr. Carrig:

Thank you for the recent update regarding the referenced subject. The Natural Resources Conservation Service (NRCS) initially notified our office of its intent to develop a memorandum of agreement to comply with Section 106 of the National Historic Preservation Act for the Henry's Fork Salinity Project in February 2012. In a letter dated March 6, 2012, we recommended that due to the potential complex nature of this project, the need for a phased approach to the identification and evaluation of historic properties, and the need to assess effects to historic properties as individual projects were proposed in the future, the NRCS consider developing a Programmatic Agreement to comply with Section 106. We understand that because the NRCS currently lacks sufficient information to identify the individual practices that may be funded through this project, you now propose to comply with Section 106 through the existing State Level Agreements with the Utah and Wyoming State Historic Preservation Officers (SHPOs) and follow 36 CFR Part 800 to consult on a case by case basis with Indian tribes and other consulting parties, as appropriate. We further understand you will follow up with each SHPO and interested Indian tribe to inform them of this change in your approach.

Due to the limited information currently available and the uncertainty as to which individual projects may be funded, we believe this to be a reasonable course of action. We remain available to provide any technical assistance you may need as you move forward. Should you have any changes or challenges in your Section 106 compliance for this project, please notify us promptly.

ADVISORY COUNCIL ON HISTORIC PRESERVATION
1100 Pennsylvania Avenue NW, Suite 803 • Washington, DC 20004
Phone: 202-606-8503 • Fax: 202-606-8647 • achp@achp.gov • www.achp.gov

2

Thank you again for this information. If you have any questions, please feel free to contact Kelly Fanizzo at 202-606-8507 or kfanizzo@achp.gov.

Sincerely,

for

Charlene Dwin Vaughn, AICP
Assistant Director
Office of Federal Agency Programs
Federal Permitting, Licensing, and Assistance Section

United States Department of Agriculture

NRCS

Natural Resources Conservation Service
100 East B Street, Room 3124
PO Box 33124
Casper, Wyoming 82602

Lori Hunsaker
Deputy State Historic Preservation Officer
Utah State Historic Preservation Office
300 S. Rio Grande Street
Salt Lake City, Utah 84101

16 February 2012

Dear Ms. Hunsaker,

Re: Section 106 Consultation: Henry's Fork Salinity Project, proposed

Per 36 CFR 800.2(a) per Section 106 of the National Historic Preservation Act, the United States Department of Agriculture Natural Resources Conservation Service (NRCS), acting as the Federal Lead Agency, in association with the U.S. Bureau of Reclamation, U.S. Bureau of Land Management, U.S. Army Corps of Engineers, Wyoming Game and Fish Department, Wyoming Department of Environmental Quality, Wyoming Department of Agriculture, and in cooperation with the Summit County Conservation District is initiating the consultation process for the proposed Henry's Fork Salinity Project in Sweetwater and Uinta Counties, Wyoming, and in Daggett and Summit Counties, Utah.

The proposed undertaking is designed to reduce salt loading to the Colorado River from irrigated agriculture, which includes on-farm irrigation water delivery systems in the proposed project area. The projected Area of Potential Effect (APE) covers approximately 21,500 acres (enclosure 1).

The proposed project has three major components: (1) to determine the contribution of the salt loading to the Colorado River from irrigated hay and pasture land; (2) to reduce salt loading through improvements in irrigation delivery and application systems; and (3) to determine environmental effects of the recommended plan- Irrigation System Improvements.

The recommended Irrigation System Improvements involve on-farm irrigation application systems with specific designs and evaluations completed on a case-by-case basis and only for the water user groups that are interested in participating. This program is strictly voluntary; each landowner or individual water user group will decide to participate in this program. The proposed project assumes that most of the surface irrigation systems in the proposed APE will be converted to side roll, center pivot, and pod sprinkler systems. A limited number of on-farm delivery ditches that transport irrigation water from the canal to the field will be improved by converting from dirt ditch to buried pipe, which will be evaluated for National Register Eligibility per Section 106 prior to any potential alteration. As a result, there are no canal modifications (i.e. conversion to pipeline or canal lining) included in this plan.

Helping People Help the Land

This proposal is not intended to bring new land under irrigation or to provide water to fields that have been infrequently or marginally irrigated. Any project measure proposed on lands without an adequate irrigation history will not be considered for funding without prior approval by the appropriate state water authority.

Due to the potential complexity of the proposed undertaking, the NRCS is developing an Environmental Impact Statement (EIS) to assess potential impacts as required by the National Environmental Policy Act (NEPA). In order to maintain compliance with the National Historic Preservation Act, the *phased approach* to Section 106 will be followed per 36 CFR 800.4(b)2. As such, a Memorandum of Agreement (MOA) that will provide for the identification and evaluation of historic properties will be developed accordingly, with the consulting parties.

In addition to initiating consultation with the Utah State Historic Preservation Office, the NRCS is initiating consultation with the Advisory Council on Historic Preservation and Wyoming State Historic Preservation Office, as well as the Northern Arapaho Tribe, Eastern Shoshone Tribe, Northern Ute Tribe, and the Shoshone - Bannock Tribes. The NRCS also identified two Certified Local Governments, the Green River Historic Preservation Commission, Sweetwater County, Wyoming, and the Summit County CLG, Summit County, Utah, that will be included in the initial consultation process.

The NRCS appreciates your taking the time with this matter and looks forward to your response regarding the Council's involvement as a consulting party. Should you have additional questions or concerns, please do not hesitate to contact me at 307-233-6754 or by email at chuck.carrig@wy.usda.gov .

Sincerely,

Chuck Carrig
State Cultural Resource Specialist

Enclosures:

Project Map

cc:

United States Department of Agriculture

NRCS

Natural Resources Conservation Service
100 East B Street, Room 3124
PO Box 33124
Casper, Wyoming 82602

Mary Hopkins
State Historic Preservation Officer
State Historic Preservation Office
2301 Central Avenue, Barrett Building
Cheyenne, Wyoming 82002-0240

16 February 2012

Dear Mrs. Hopkins,

Re: Section 106 Consultation: Henry's Fork Salinity Project, proposed

Per 36 CFR 800.2(a) per Section 106 of the National Historic Preservation Act, the United States Department of Agriculture Natural Resources Conservation Service (NRCS), acting as the Federal Lead Agency, in association with the U.S. Bureau of Reclamation, U.S. Bureau of Land Management, U.S. Army Corps of Engineers, Wyoming Game and Fish Department, Wyoming Department of Environmental Quality, Wyoming Department of Agriculture, and in cooperation with the Summit County Conservation District is initiating the consultation process for the proposed Henry's Fork Salinity Project in Sweetwater and Uinta Counties, Wyoming, and in Daggett and Summit Counties, Utah.

The proposed undertaking is designed to reduce salt loading to the Colorado River from irrigated agriculture, which includes on-farm irrigation water delivery systems in the proposed project area. The projected Area of Potential Effect (APE) covers approximately 21,500 acres (enclosure 1).

The proposed project has three major components: (1) to determine the contribution of the salt loading to the Colorado River from irrigated hay and pasture land; (2) to reduce salt loading through improvements in irrigation delivery and application systems; and (3) to determine environmental effects of the recommended plan- Irrigation System Improvements.

The recommended Irrigation System Improvements involve on-farm irrigation application systems with specific designs and evaluations completed on a case-by-case basis and only for the water user groups that are interested in participating. This program is strictly voluntary; each landowner or individual water user group will decide to participate in this program. The proposed project assumes that most of the surface irrigation systems in the proposed APE will be converted to side roll, center pivot, and pod sprinkler systems. A limited number of on-farm delivery ditches that transport irrigation water from the canal to the field will be improved by converting from dirt ditch to buried pipe, which will be evaluated for National Register Eligibility per Section 106 prior to any potential alteration. As a result, there are no canal modifications (i.e. conversion to pipeline or canal lining) included in this plan.

This proposal is not intended to bring new land under irrigation or to provide water to fields that have been infrequently or marginally irrigated. Any project measure proposed on lands without an adequate irrigation history will not be considered for funding without prior approval by the appropriate state water authority.

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In addition to initiating consultation with the Wyoming State Historic Preservation Office the NRCS is initiating consultation with Advisory Council on Historic Preservation , the Utah State Historic Preservation Office as well as the Northern Arapaho Tribe, Eastern Shoshone Tribe, Northern Ute Tribe, and the Shoshone - Bannock Tribes. The NRCS also identified two Certified Local Governments, the Green River Historic Preservation Commission, Sweetwater County, Wyoming, and the Summit County CLG, Summit County, Utah, that will be included in the initial consultation process.

The NRCS appreciates your taking the time with this matter and looks forward to your response regarding the Council's involvement as a consulting party. Should you have additional questions or concerns, please do not hesitate to contact me at 307-233-6754 or by email at chuck.carrig@wy.usda.gov .

Sincerely,

Chuck Carrig
State Cultural Resource Specialist

Enclosures:

Project Map

cc:

United States Department of Agriculture

NRCS

Natural Resources Conservation Service
100 East B Street, Room 3124
PO Box 33124
Casper, Wyoming 82602

Northern Arapaho Tribes
Jim L. Shakespeare, Chairman
P.O Box 396
Ft. Washakie, WY 82514

February 8, 2012

Re: Government to Government Consultation: Henry's Fork Salinity Project, proposed

Dear Chairman Shakesphere:

Per 36 CFR 800.2(a) per Section 106 of the National Historic Preservation Act, the United States Department of Agriculture Natural Resources Conservation Service (NRCS), acting as the Federal Lead Agency, in association with the U.S. Bureau of Reclamation, U.S. Bureau of Land Management, U.S. Army Corps of Engineers, Wyoming Game and Fish Department , Wyoming Department of Environmental Quality, Wyoming Department of Agriculture, and in cooperation with the Summit County Conservation District is initiating the consultation process for the proposed Henry's Fork Salinity Project in Sweetwater and Uinta Counties, Wyoming and in Daggett and Summit Counties, Utah.

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In addition to being voluntary, the proposed project assumes that most of the surface irrigation systems in the proposed APE will be converted to side roll, center pivot, and pod sprinkler systems. A limited number of on-farm delivery ditches that transport irrigation water from the canal to the field will be improved by converting from dirt ditch to buried pipe, which will be evaluated for National Register Eligibility per Section 106 prior to any potential alteration. As a result, there are no canal modifications (i.e. conversion to pipeline or canal lining) included in this plan.

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The NRCS respectfully requests your input regarding known historic properties or concerns with cultural related issues within the area of potential effect. Moreover, the NRCS would also like to extend an invitation to become a participating agency in the Section 106 process for development of the proposed Henry's Fork Salinity project Environmental Impact Statement (EIS) that will assess potential impacts as required by the National Environmental Policy Act (NEPA). In order to maintain compliance with the National Historic Preservation Act, the *phased approach* to Section 106 will be followed per 36 CFR 800.4(b)2. As such, a Memorandum of Agreement (MOA) that will provide for the identification and evaluation of historic properties will be developed accordingly, with the consulting parties.

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Sincerely,

Chuck Carrig
State Cultural Resource Specialist

Enclosure:

Project Map

United States Department of Agriculture

NRCS

Natural Resources Conservation Service
100 East B Street, Room 3124
PO Box 33124
Casper, Wyoming 82602

Northern Arapaho Tribes
Darlene Conrad, THPO
P.O Box 396
Ft. Washakie, WY 82514

February 8, 2012

Re: Government to Government Consultation: Henry's Fork Salinity Project, proposed

Dear Ms. Conrad:

Per 36 CFR 800.2(a) per Section 106 of the National Historic Preservation Act, the United States Department of Agriculture Natural Resources Conservation Service (NRCS), acting as the Federal Lead Agency, in association with the U.S. Bureau of Reclamation, U.S. Bureau of Land Management, U.S. Army Corps of Engineers, Wyoming Game and Fish Department , Wyoming Department of Environmental Quality, Wyoming Department of Agriculture, and in cooperation with the Summit County Conservation District is initiating the consultation process for the proposed Henry's Fork Salinity Project in Sweetwater and Uinta Counties, Wyoming and in Daggett and Summit Counties, Utah.

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An Equal Opportunity Provider and Employer

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Sincerely,

Chuck Carrig
State Cultural Resource Specialist

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Project Map

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Natural Resources Conservation Service
100 East B Street, Room 3124
PO Box 33124
Casper, Wyoming 82602

Eastern Shoshone Tribe
Mike Lajeunesse, Chairman
P.O. Box 538
Ft. Washakie, WY 82514

February 8, 2012

Re: Government to Government Consultation: Henry's Fork Salinity Project, proposed

Dear Chairman Lajeunesse:

Per 36 CFR 800.2(a) per Section 106 of the National Historic Preservation Act, the United States Department of Agriculture Natural Resources Conservation Service (NRCS), acting as the Federal Lead Agency, in association with the U.S. Bureau of Reclamation, U.S. Bureau of Land Management, U.S. Army Corps of Engineers, Wyoming Game and Fish Department , Wyoming Department of Environmental Quality, Wyoming Department of Agriculture, and in cooperation with the Summit County Conservation District is initiating the consultation process for the proposed Henry's Fork Salinity Project in Sweetwater and Uinta Counties, Wyoming and in Daggett and Summit Counties, Utah.

The proposed undertaking is designed to reduce salt loading to the Colorado River from irrigated agriculture, which includes on-farm irrigation water delivery systems in the proposed project area. The projected Area of Potential Effect (APE) covers approximately 21,500 acres (enclosure 1).

The proposed project has three major components: (1) to determine the contribution of the salt loading to the Colorado River from irrigated hay and pasture land; (2) to reduce salt loading through improvements in irrigation delivery and application systems; and (3) to determine environmental effects of the recommended plan- Irrigation System Improvements.

The recommended Irrigation System Improvements involve on-farm irrigation application systems with specific designs and evaluations completed on a case-by-case basis and only for the water user groups that are interested in participating. This program is strictly voluntary; each landowner or individual water user group will decide to participate in this program.

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The NRCS appreciates your taking the time with this matter and looks forward to your response regarding the Eastern Shoshone Tribe's involvement as a consulting party. Should you have additional questions or concerns, please contact me at 307-233-6754 or by email at chuck.carrig@wy.usda.gov .

Sincerely,

Chuck Carrig
State Cultural Resource Specialist

Enclosure:

Project Map

United States Department of Agriculture

NRCS

Natural Resources Conservation Service
100 East B Street, Room 3124
PO Box 33124
Casper, Wyoming 82602

Eastern Shoshone Tribe
Wilfred Ferris, THPO
P.O. Box 538
Ft. Washakie, WY 82514

February 8, 2012

Re: Government to Government Consultation: Henry's Fork Salinity Project, proposed

Dear Mr. Ferris:

Per 36 CFR 800.2(a) per Section 106 of the National Historic Preservation Act, the United States Department of Agriculture Natural Resources Conservation Service (NRCS), acting as the Federal Lead Agency, in association with the U.S. Bureau of Reclamation, U.S. Bureau of Land Management, U.S. Army Corps of Engineers, Wyoming Game and Fish Department , Wyoming Department of Environmental Quality, Wyoming Department of Agriculture, and in cooperation with the Summit County Conservation District is initiating the consultation process for the proposed Henry's Fork Salinity Project in Sweetwater and Uinta Counties, Wyoming and in Daggett and Summit Counties, Utah.

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Chuck Carrig
State Cultural Resource Specialist

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Project Map

United States Department of Agriculture

NRCS

Natural Resources Conservation Service
100 East B Street, Room 3124
PO Box 33124
Casper, Wyoming 82602

Shoshone-Bannock Tribes
Alonzo Coby, Chairman
PO Box 306
Fort Hall, ID 83203

February 8, 2012

Re: Government to Government Consultation: Henry's Fork Salinity Project, proposed

Dear Chairman Coby:

Per 36 CFR 800.2(a) per Section 106 of the National Historic Preservation Act, the United States Department of Agriculture Natural Resources Conservation Service (NRCS), acting as the Federal Lead Agency, in association with the U.S. Bureau of Reclamation, U.S. Bureau of Land Management, U.S. Army Corps of Engineers, Wyoming Game and Fish Department , Wyoming Department of Environmental Quality, Wyoming Department of Agriculture, and in cooperation with the Summit County Conservation District is initiating the consultation process for the proposed Henry's Fork Salinity Project in Sweetwater and Uinta Counties, Wyoming and in Daggett and Summit Counties, Utah.

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The NRCS appreciates your taking the time with this matter and looks forward to your response regarding the Shoshone-Bannock Tribes' involvement as a consulting party. Should you have additional questions or concerns, please contact me at 307-233-6754 or by email at chuck.carrig@wy.usda.gov .

Sincerely,

Chuck Carrig
State Cultural Resource Specialist

Enclosure:

Project Map

United States Department of Agriculture

NRCS

Natural Resources Conservation Service
100 East B Street, Room 3124
PO Box 33124
Casper, Wyoming 82602

Shoshone-Bannock Tribes
Yvette Tuell, Environmental Program Manager
PO Box 306
Fort Hall, ID 83203

6 February 2012

Re: Government to Government Consultation: Henry's Fork Salinity Project, proposed

Dear Ms. Tuell:

Per 36 CFR 800.2(a) per Section 106 of the National Historic Preservation Act, the United States Department of Agriculture Natural Resources Conservation Service (NRCS), acting as the Federal Lead Agency, in association with the U.S. Bureau of Reclamation, U.S. Bureau of Land Management, U.S. Army Corps of Engineers, Wyoming Game and Fish Department , Wyoming Department of Environmental Quality, Wyoming Department of Agriculture, and in cooperation with the Summit County Conservation District is initiating the consultation process for the proposed Henry's Fork Salinity Project in Sweetwater and Uinta Counties, Wyoming and in Daggett and Summit Counties, Utah.

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Chuck Carrig
State Cultural Resource Specialist

Enclosure:

Project Map

United States Department of Agriculture

NRCS

Natural Resources Conservation Service
100 East B Street, Room 3124
PO Box 33124
Casper, Wyoming 82602

Northern Ute Tribe
Irene Cuch, Chairman
P.O. Box 190
Ft. Duchesne, UT 84026-0190

February 8, 2012

Re: Government to Government Consultation: Henry's Fork Salinity Project, proposed

Dear Chairman Cuch:

Per 36 CFR 800.2(a) per Section 106 of the National Historic Preservation Act, the United States Department of Agriculture Natural Resources Conservation Service (NRCS), acting as the Federal Lead Agency, in association with the U.S. Bureau of Reclamation, U.S. Bureau of Land Management, U.S. Army Corps of Engineers, Wyoming Game and Fish Department , Wyoming Department of Environmental Quality, Wyoming Department of Agriculture, and in cooperation with the Summit County Conservation District is initiating the consultation process for the proposed Henry's Fork Salinity Project in Sweetwater and Uinta Counties, Wyoming and in Daggett and Summit Counties, Utah.

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Sincerely,

Chuck Carrig
State Cultural Resource Specialist

Enclosure:

Project Map

United States Department of Agriculture

NRCS

Natural Resources Conservation Service
100 East B Street, Room 3124
PO Box 33124
Casper, Wyoming 82602

Northern Ute Tribe
Betsy Chapoose, THPO
P.O. Box 190
Ft. Duchesne, UT 84026-0190

February 8, 2012

Re: Government to Government Consultation: Henry's Fork Salinity Project, proposed

Dear Ms. Chapoose,

Per 36 CFR 800.2(a) per Section 106 of the National Historic Preservation Act, the United States Department of Agriculture Natural Resources Conservation Service (NRCS), acting as the Federal Lead Agency, in association with the U.S. Bureau of Reclamation, U.S. Bureau of Land Management, U.S. Army Corps of Engineers, Wyoming Game and Fish Department , Wyoming Department of Environmental Quality, Wyoming Department of Agriculture, and in cooperation with the Summit County Conservation District is initiating the consultation process for the proposed Henry's Fork Salinity Project in Sweetwater and Uinta Counties, Wyoming and in Daggett and Summit Counties, Utah.

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Sincerely,

Chuck Carrig
State Cultural Resource Specialist

Enclosure:

Project Map

United States Department of Agriculture

NRCS

Natural Resources Conservation Service
100 East B Street, Room 3124
PO Box 33124
Casper, Wyoming 82602

Summit County Certified Local Government
Ms. Claudia McMullin
60 North Main
P.O. Box 128
Coalville, UT 84017

February 8, 2012

Re: Henry's Fork Salinity Project, proposed

Dear Ms. McMullin:
Per 36 CFR 800.2(a) per Section 106 of the National Historic Preservation Act, the United States Department of Agriculture Natural Resources Conservation Service (NRCS), acting as the Federal Lead Agency, in association with the U.S. Bureau of Reclamation, U.S. Bureau of Land Management, U.S. Army Corps of Engineers, Wyoming Game and Fish Department , Wyoming Department of Environmental Quality, Wyoming Department of Agriculture, and in cooperation with the Summit County Conservation District is initiating the consultation process for the proposed Henry's Fork Salinity Project in Sweetwater and Uinta Counties, Wyoming and in Daggett and Summit Counties, Utah.

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Sincerely,

Chuck Carrig
State Cultural Resource Specialist

Enclosure:

Project Map

United States Department of Agriculture

NRCS

Natural Resources Conservation Service
100 East B Street, Room 3124
PO Box 33124
Casper, Wyoming 82602

Green River Historic Preservation Commission
Ruth Lauritzen
Sweetwater County Historical Museum
3 East Flaming Gorge Way
Green River, WY 82935

February 8, 2012

Re: Henry's Fork Salinity Project, proposed

Dear Ms. Lauritzen:

Per 36 CFR 800.2(a) per Section 106 of the National Historic Preservation Act, the United States Department of Agriculture Natural Resources Conservation Service (NRCS), acting as the Federal Lead Agency, in association with the U.S. Bureau of Reclamation, U.S. Bureau of Land Management, U.S. Army Corps of Engineers, Wyoming Game and Fish Department , Wyoming Department of Environmental Quality, Wyoming Department of Agriculture, and in cooperation with the Summit County Conservation District is initiating the consultation process for the proposed Henry's Fork Salinity Project in Sweetwater and Uinta Counties, Wyoming and in Daggett and Summit Counties, Utah.

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Sincerely,

Chuck Carrig
State Cultural Resource Specialist

Enclosures:

Project Map

Appendix D Economic Factors

Annual Material and Cost Inflation	3%
Discount Rate	4%
New Acres Treated	14,096
Irrigation Season (Days)	70
Project Life (yr)	35
Average Treatment Cost ($/ac)	$ 2,007
Average Operating Labor +ATV+Elec. ($/ac/yr)	$ 32
Typical System in Project	
Installation Period (yr)	20
Grass Hay ($/ton)	$ 100.00
Flood Labor + ATV ($/ac/yr)	$ 33
Yield Increase (tons/ac)	1.8
Salt Reduction (tons/ac/yr)	0.46
Salt Benefit ($/ton)	$ 173

Detail

Factor	***Reference***
Project Area	
Total Project Area – 20,709 acres.	*Henrys Fork Salinity Control Project, Environmental Assessment. Sept, 2010 (HFEA).*
Total of 14,096 acres to be treated – 70% participation (minus 400 acres already treated). • Maximum under treatment during life of project due to installation period and equipment design life – 10,575 acres.	*Whicker, Ed. 2010 Colorado River Basin Salinity Control Program Proposed Salinity Area – Upper Henrys Fork Unit. Hydrosalinity Analysis. NRCS – Roosevelt, UT. 01/12/2010. HFEA.* *Jeff Lewis, NRCS Project Manager 01-13-2012*
Salinity Reduction	
$173 benefit per ton of salt removed in Colorado River.	*U.S. Department of the Interior, Quality of Water Colorado River Basin, Progress, Report No. 23, 2011. p.10*
0.46 tons/ac/yr salt reduction per acre treated.	*Whicker, Ed. 2010 Colorado River Basin Salinity Control Program Proposed Salinity Area – Upper Henrys Fork Unit. Hydrosalinity Analysis. NRCS – Roosevelt, UT. 01/12/2010.* *Lynn Cornia- NRCS Irrigation Engineer 01/29/2012.*
Forage production	
Hay Yield Increase 1.8 tons/acre/yr (+119%).	*Results of Western Wyoming High Elevation Hay production survey - NRCS, Nov 2011. Low Management situations with baseline of 1.5 tons/ac and "low mgmt" improvements following water conservation treatment.*
Post treatment price for large good squares of grass hay – $100/ton. Lower pre-treatment hay quality is assumed to yield $85/ton.	*Average price for 2006-2010 for grass hay. 2011 Wyoming Agricultural Statistics. USDA-NASS.*
Interest Rates and Term	
Discount rate – 4.0% for NPV calculation.	*OMB Circular No. A-94. Appendix C. December 2010*
Materials, hay, labor, fuel inflation – 3%.	*2005-2011 Average*
Project Life – 35 years.	*20-year implementation plus 15-year equipment life.*

Irrigation Practices	
Untreated – 95 to 100% open ditch flood	*Jeff Lewis, District Conservationist, Field Office, Lyman, Wyoming, NRCS Henrys Fork Project Manager. May 2011 (J. Lewis , May 2011)*
Full Treatment – 35% wheel line, 35% pod, 20% pivot, and 10% gated pipe. 20-year installation.	*J. Lewis , May 2011*
Typical Field – 37 acres	*Weighted average of treatment type; acres and proportion of area treated.*
Days of Irrigation - 70	*J. Lewis , May 2011*
½ Pivot Scenario(practice #442)	
Typical – 68 ac, 1,320 ft, $66.18/ft of pivot.	*2012 NRCS Northern Mountain Regional Practice Payment Schedule (2012 PPS)*
Wheel Line Scenario (practice #442)	
Typical – 40 ac, 1320 ft (w/1000 ft mainline) $19.34/ft of wheel line	*2012 PPS.*
Pod Scenario (practice #442)	
Typical – 20 ac, 40 pods, 360 ft, $440.41/ac	*2012 PPS.*
Gated Pipe Scenario (practice #442	
Typical – 20 ac, 1320 ft, $4.49 ft	*2012 PPS.*
2,000 feet delivery pipe per typical field $5.90/ft. and 1,000 feet mainline with risers $14.35/ft on pod and wheel line systems.	*2012 PPS, Practice #430*
Operations Cost Units	
Pivot Drive Wheel Elec. Costs - $200/yr. 8 tower side-wiper pivot, 70 days irrigation, w/ 1 hp motors at each tower, 28% load factor, 90% efficient and $0.075/kwh.	*Motor System Operating Calculator. Productive Energy Systems LLC.* *http://www.productiveenergy.com/calculator/motor.asp*
Pump Cost - $333.95/hp. 15 hp pump suitable for up to 2" water application on pivot, wheel, or pod system – (Needed on 10% of ac, not gated pipe).	*System Pumping Requirements-Calculator. Irrigation in the Pacific Northwest, WSU, OSU, ISU Extension.* *http://irrigation.wsu.edu/index.php* Wyoming NRCS Center Pivot Calculator. 2012 PPS
15 hp Pump Electricity Cost – $1000/yr (10% of acres) – not gated pipe) 75% load, 90% eff.	*Motor System Operating Calculator. Productive Energy Systems LLC.* *http://www.productiveenergy.com/calculator/motor.asp*
Irrigation Labor - $16.01/hr	Mean Wage for Farm workers – Farm and Ranch. SW Wyoming Region Occupational Employment and Wages. *Wyoming Department of Employment. September 2011*
Pivot Labor on 68 ac – 0.05 hr/day. $0.82/ac/yr	
Wheel Line Labor on 30 acres – 1 hr/day. $28/ac/yr	
Pod labor on 20 acres – 0.67 hr/day (NRCS #442 typical scenario). $37.52/ac/yr	*K-Line Irrigation of North America, St. Joseph, MI* *5-minute move time plus 5-minute travel/set-up per 10 pod line.*
Gated Pipe labor on 20 acres – 0.25 hr/day. $14/ac/yr	
Flood labor on 10 acres - 0.25 hr/day. $28/ac/yr	
ATV costs for fuel and maintenance – $3.5/hr. Average 80% of labor time spent on ATV.	*Adapted from: Gentry, Russ. 2005. Operating Costs of ATVs Vary Widely.* Ag News and Views *- June 2005. The Samuel Roberts Noble Foundation Inc. Ardmore, Okla.* *4-year average of 6 ATV models (22-30hp)*

Appendix E Biological Opinion

United States Department of the Interior

FISH AND WILDLIFE SERVICE

Ecological Services
5353 Yellowstone Road, Suite 308A
Cheyenne, Wyoming 82009

In Reply Refer To:
06E13000/WY12F0383

DEC 05 2012

Astrid Martinez, State Conservationist
Natural Resources Conservation Service
P.O. Box 33124
Casper, Wyoming 82602

Subject: Final Biological Opinion for the Henry's Fork Salinity Control Irrigation Project, Sweetwater and Uinta Counties, Wyoming

Dear Ms. Martinez:

In accordance with section 7 of the Endangered Species Act (ESA) of 1973, as amended (16 U.S.C. 1531 *et seq.*), and the Interagency Cooperation Regulations (50 CFR 402), this document transmits the U.S. Fish and Wildlife Service's (USFWS) biological opinion based on our review of the proposed Henry's Fork Salinity Control Irrigation Project located in Sweetwater and Uinta Counties, Wyoming, and its effects on the endangered Colorado pikeminnow (*Ptychocheilus lucius*), humpback chub (*Gila cypha*), bonytail (*Gila elegans*), and razorback sucker (*Xyrauchen texanus*) and their critical habitats.

This biological opinion is in response to your September 20, 2012, correspondence requesting initiation of consultation for the Henry's Fork Salinity Control Irrigation Project (Project). The USFWS concurs that the proposed project may adversely affect the endangered Colorado pikeminnow (*Ptychocheilus lucius*), humpback chub (*Gila cypha*), bonytail (*Gila elegans*), and razorback sucker (*Xyrauchen texanus*) and their designated critical habitat on the Colorado River.

Additionally, you requested concurrence on your determination that the proposed Project may affect, but is not likely to adversely affect, the federally threatened Ute ladies'-tresses orchid (*Spiranthes diluvialis*). Based on the information provided in your Biological Assessment, we concur with your determination that the Project, as currently proposed, is not likely to adversely affect the Ute ladies'-tresses orchid.

CONSULTATION HISTORY

On January 21-22, 1988, the Secretary of the Department of the Interior; the Governors of Wyoming, Colorado, and Utah; and the Administrator of the Western Area Power Administration signed a Cooperative Agreement to implement the "Recovery Implementation Program for Endangered Fish Species in the Upper Colorado River Basin" (USFWS 1987). In 2001, the Recovery Program was extended until September 30, 2013. The objective of the Recovery Program is to recover the listed species while water development continues in accordance with Federal and State laws and interstate compacts.

In order to further define and clarify processes outlined in sections 4.1.5, 4.1.6, and 5.3.4 of the Recovery Program, a section 7 Agreement (Agreement) and a Recovery Implementation Program Recovery Action Plan (RIPRAP) was developed (USFWS 1993). The Agreement establishes a framework for conducting all future section 7 consultations on depletion impacts related to new projects and all impacts associated with historic projects in the Upper Basin. Procedures outlined in the Agreement are used to determine if sufficient progress is being accomplished in the recovery of the endangered fishes to enable the Recovery Program to serve as a reasonable and prudent alternative (RPA) to avoid jeopardy. The RIPRAP was finalized on October 15, 1993, and has been reviewed and updated annually.

In accordance with the 1993 Agreement, the USFWS annually assesses progress of the implementation of recovery actions to determine if progress toward recovery has been sufficient for the Recovery Program to serve as a RPA for projects that deplete water from the Colorado River. In the last review, the USFWS determined that the Recovery Program has made sufficient progress to offset water depletions from individual projects up to 4,500 acre-feet/year. Therefore, it is appropriate for the Recovery Program actions to serve as Conservation Measures in the project description for projects up to 4,500 acre-feet/year.

After many years of successful implementation of the Recovery Program and Agreement, Federal action agencies have come to anticipate Recovery Program activities and a requirement of a financial contribution (for new depletions greater than 100 acre-feet) toward these activities serving as RPAs that must be included in their project planning to avoid jeopardy to listed species. Thus, the RPA has essentially become part of the proposed action. The Recovery Program activities will now serve as conservation measures within the proposed action and minimize adverse effects to listed species or critical habitat. The following excerpts summarize portions of the Recovery Program that address depletion impacts, section 7 consultation, and Project proponent responsibilities:

> "All future section 7 consultations completed after approval and implementation of this program (establishment of the Implementation Committee, provision of congressional funding, and initiation of the elements) will result in a one-time contribution to be paid to the Service [USFWS] by water project proponents in the amount of $10.00 per acre-foot based on the average annual depletion of the project . . . This figure will be adjusted annually for inflation [the current figure for FY2013 is $19.82 per acre-foot] . . . Concurrently with the completion of the Federal action which initiated the consultation, e.g., . . . issuance of a 404 permit, 10 percent of the total contribution will be provided. The balance . . . will be . . . due at the time the construction commences . . . ."

It is important to note that these provisions of the Recovery Program were based on appropriate legal protection of the instream flow needs of the endangered Colorado River fishes. The Recovery Program further states:

> ". . . it is necessary to protect and manage sufficient habitat to support self-sustaining populations of these species. One way to accomplish this is to provide long term protection of the habitat by acquiring or appropriating water rights to ensure instream flows. Since this program sets in place a mechanism and a commitment to assure that the instream flows are protected under State law, <u>the Service [USFWS] will consider these elements under section 7 consultation as offsetting project depletion impacts</u>."

BIOLOGICAL OPINION

This biological opinion addresses an average annual depletion of approximately 1,372 acre-feet of water from the Upper Colorado River Basin. Water depletions in the Upper Basin have been recognized as a major source of impact to endangered fish species. Continued water withdrawal has restricted the ability of the Colorado River system to produce flow conditions required by various life stages of the fishes.

Critical habitat has been designated for the Colorado pikeminnow, humpback chub, bonytail, and razorback sucker within the 100-year floodplain in portions of their historic range (59 FR 13374). Destruction or adverse modification of critical habitat is defined in 50 CFR 402.02 as a direct or indirect alteration that appreciably diminishes the value of critical habitat for both the survival and recovery of a listed species. In considering the biological basis for designating critical habitat, the USFWS focused on the primary physical and biological elements that are essential to the conservation of the species without consideration of land or water ownership or management. The USFWS has identified water, physical habitat, and biological environment as the primary constituent elements. This includes a quantity of water of sufficient quality that is delivered to a specific location in accordance with a hydrologic regime that is required for the particular life stage for each species. Water depletions reduce the ability of the river system to provide the required water quantity and hydrologic regime necessary for recovery of the fishes. The physical habitat includes areas of the Colorado River system that are inhabited or potentially habitable for use in spawning and feeding, as a nursery, or serve as corridors between these areas. In addition, oxbows, backwaters, and other areas in the 100-year flood plain, when inundated, provide access to spawning, nursery, feeding, and rearing habitats

DESCRIPTION OF THE PROPOSED ACTION

<u>Action Area</u>
Our regulations define the action area as all areas directly or indirectly affected by the Federal action and not merely the immediate area involved in the action (50 CFR 402.02). The subject Project and its associated water depletions would result in a loss of water from the Upper Colorado River Basin.

The Colorado River Basin Salinity Control Act (Public Law 93-320) firmly establishes that the purpose of salinity control projects is to reduce the salt load carried by the Colorado River. Two national objectives form the basis for planning salinity control activities: (1) protect and enhance national economic development, and (2) protect and enhance environmental quality. This will be accomplished through accelerated technical and financial assistance for the installation of on-farm irrigation improvements within the Henry's Fork watershed using funding available through the USDA Environmental Quality Incentives Program (EQIP).

The Project is designed to reduce salt loading to the Colorado River from irrigated agriculture, which includes on-farm irrigation system improvements and some on-farm water delivery ditches in the project area. It is estimated that 70 percent of the 20,709 acres under flood irrigation within the proposed Project area will be treated with more efficient irrigation practices over the next 20 years resulting in an estimated reduction of 6,400 tons of salt per year into the Colorado River System.

The Federal actions associated with this Project include technical and financial assistance provided by NRCS to private landowners interested in converting from flood irrigation to a sprinkler style irrigation system. Converting from flood irrigation to a sprinkler system will require the elimination of some on-farm irrigation ditches and may increase the number of water pumping plants within the Project area if gravity-fed systems are not feasible. This conversion will result in less water applied to agricultural fields, thereby reducing irrigation runoff, ultimately resulting in less water flowing into wetlands benefitting wholly, or in part, from irrigation return flow.

Additionally, water budget estimates associated with implementation of the proposed Project indicate that the consumptive water use of agricultural crops will increase from 30,361 acre-feet per year to 37,799 acre-feet per year from changes in the crops produced: an increase of 7,438 acre-feet per year. However, because of the reduction in irrigation runoff associated with Project implementation, it is estimated that consumptive water use by phreatophytes will decrease by 6,066 acre-feet per year. Consequently, there will be an estimated net increase in consumptive water use of 1,372 acre-feet per year (i.e., 7,438 – 6,066 = 1,372).

Conservation Measures

Conservation measures are actions that the action agency and applicant agree to implement to further the recovery of the species under review. The beneficial effects of conservation measures are taken into consideration for determining both jeopardy and adverse modification analyses. As explained in the Consultation History section, the Recovery Program is intended to implement actions that are needed to recover the endangered fishes and avoid jeopardy and adverse modification of critical habitat. Included in the Recovery Program is a requirement for projects that cause water depletions greater that 100 acre-feet/year project proponents make monetary contributions to the Recover Program. The U.S. Department of Agriculture, Natural Resources Conservation Service (NRCS) agrees to incorporate any required contribution as a condition of any issued permit or authorization. The conservation measures for this project are below:

The Recovery Program will serve as conservation measures to minimize adverse affects to the endangered fishes and their critical habitat caused by the project's water depletions. Depletion impacts can be offset by accomplishment of activities necessary to recover the endangered fishes as specified under the RIPRAP and the water Project proponent's one-time contribution to the Recovery Program for new depletions greater than 100 acre-feet per year.

New Depletion
As the project's average annual new depletion of 1,372 acre-feet is below the current sufficient progress threshold of 4,500 acre-feet, the Recovery Program will serve as conservation measures to minimize adverse affects to the Colorado pikeminnow, razorback sucker, humpback chub, and bonytail and destruction or adverse modification of critical habitat caused by the project's new depletion.

With respect to the depletion contribution, the applicant will make a one-time payment which has been calculated by multiplying the Project's average annual depletion by the depletion charge in effect at the time payment is made. For Fiscal Year 2013 (October 1, 2012, to September 30, 2013), the depletion charge is $19.82 per acre-foot for the average annual depletion which equals a total payment of $27,193.04 for this Project. Ten percent of the total payment (i.e., $2,719.30) will be provided to the USFWS's designated agent, the National Fish and Wildlife Foundation (Foundation), at the time of issuance of the Federal approvals from the NRCS. The balance will be due at the time the construction commences. The payment will be included by the NRCS as a permit stipulation. The amount payable will be adjusted annually for inflation on October 1 of each year based on the Composite Consumer Price Index. All payments should be made to the Foundation:

National Fish and Wildlife Foundation
Attn: Donna McNamara, Finance Department
1133 15th Street, NW, Suite 1100
Washington DC 20005

The payment will be accompanied by a cover letter that identifies the project and biological opinion number WY12F0383 that requires the payment, the amount of payment enclosed, check number, and the following notation on the check – "Upper Colorado Fish Recovery Program, NA.1104". The cover letter also shall identify the name and address of the payor, the name and address of the Federal Agency responsible for authorizing the project, and the address of the USFWS office issuing the biological opinion. This information will be used by the Foundation to notify the NRCS and the USFWS that payment has been received. The Foundation is to send notices of receipt to these entities within 5 working days of its receipt of payment.

STATUS OF THE SPECIES AND CRITICAL HABITAT

COLORADO PIKEMINNOW

Species Description
The Colorado pikeminnow is the largest cyprinid fish (minnow family) native to North America and evolved as the main predator in the Colorado River system. It is an elongated pike-like fish that during predevelopment times may have grown as large as 6 feet in length and weighed nearly 100 pounds (Behnke and Benson 1983). Today, Colorado pikeminnow rarely exceed 3 feet in length or weigh more than 18 pounds; such fish are estimated to be 45 to 55 years old (Osmundson et al. 1997). The mouth of this species is large and nearly horizontal with long slender pharyngeal teeth (located in the throat), adapted for grasping and holding prey. The diet of Colorado pikeminnow longer than 3 or 4 inches consists almost entirely of other fishes (Vanicek and Kramer 1969). Males become sexually mature earlier and at a smaller size than do females, though all are mature by about age 7 and 20 inches in length (Vanicek and Kramer

1969; Seethaler 1978; Hamman 1981). Adults are strongly countershaded with a dark, olive back, and a white belly. Young are silvery and usually have a dark, wedge-shaped spot at the base of the caudal fin.

Status and Distribution

Based on early fish collection records, archaeological finds, and other observations, the Colorado pikeminnow was once found throughout warmwater reaches of the entire Colorado River Basin down to the Gulf of California, and including reaches of the upper Colorado River and its major tributaries, the Green River and its major tributaries, and the Gila River system in Arizona (Seethaler 1978). Colorado pikeminnow apparently were never found in colder, headwater areas. The species was abundant in suitable habitat throughout the entire Colorado River Basin prior to the 1850s (Seethaler 1978). No historic records exist that would indicate how far upstream Colorado pikeminnow once occurred in the Colorado River. The only reliable account of the species occurring upstream of the Price Stubb Dam near Palisade, Colorado is from a USFWS biologist who reports having captured Colorado pikeminnow 2-3 miles up Plateau Creek while angling there around 1960 (Robert Burdick pers. comm.). By the 1970s they were extirpated from the entire lower basin (downstream of Glen Canyon Dam) and portions of the Upper Basin as a result of major alterations to the riverine environment. Having lost some 75 to 80 percent of its former range due to habitat loss, the Colorado pikeminnow was federally listed as an endangered species in 1967 (Miller 1961; Moyle 1976; Tyus 1991; Osmundson and Burnham 1998). Full protection under the ESA of 1973 occurred on January 4, 1974.

Colorado pikeminnow are presently restricted to the Upper Colorado River Basin and inhabit warmwater reaches of the Colorado, Green, and San Juan Rivers and associated tributaries. The Colorado pikeminnow recovery goals (USFWS 2002a) identify occupied habitat of wild Colorado pikeminnow as follows: the Green River from Lodore Canyon to the confluence of the Colorado River; the Yampa River downstream of Craig, Colorado; the Little Snake River from its confluence with the Yampa River upstream into Wyoming; the White River downstream of Taylor Draw Dam; the lower 89 miles of the Price River; the lower Duchesne River; the upper Colorado River from Palisade, Colorado, to Lake Powell; the lower 34 miles of the Gunnison River; the lower mile of the Dolores River; and 150 miles of the San Juan River downstream from Shiprock, New Mexico, to Lake Powell.

Major declines in Colorado pikeminnow populations occurred during the dam-building era of the 1930s through the 1960s. Behnke and Benson (1983) summarized the decline of the natural ecosystem, pointing out that dams, impoundments, and water use practices drastically modified the river's natural hydrology and channel characteristics throughout the Colorado River Basin. Dams on the mainstem broke the natural continuum of the river ecosystem into a series of disjunct segments, blocking native fish migrations, reducing temperatures downstream of dams, creating lacustrine habitat, and providing conditions that allowed competitive and predatory nonnative fishes to thrive both within the impounded reservoirs and in the modified river segments that connect them. The highly modified flow regime in the lower basin coupled with the introduction of nonnative fishes decimated populations of native fish.

Major declines of native fishes first occurred in the lower basin where large dams were constructed from the 1930s through the 1960s. In the Upper Basin, the following major dams were not constructed until the 1960s: Glen Canyon Dam on the mainstem Colorado River, Flaming Gorge Dam on the Green River, Navajo Dam on the San Juan River, and the Aspinall

Unit Dams on the Gunnison River. To date, some native fish populations in the Upper Basin have managed to persist, while others have become nearly extirpated. River segments where native fish have declined more slowly than in other areas are those where the hydrologic regime most closely resembles the natural condition, such as the Yampa River, where adequate habitat for important life phases still exists, and where migration corridors are unblocked and allow connectivity among life phases.

Threats to the Species

The primary threats to Colorado pikeminnow are stream flow regulation and habitat modification; competition with and predation by nonnative fishes; and pesticides and pollutants (USFWS 2002a). The existing habitat, altered by these threats, has been modified to the extent that it impairs essential behavior patterns, such as breeding, feeding, and sheltering. These impairments are described in further detail below.

Stream flow regulation includes main stem dams that cause the following adverse effects to Colorado pikeminnow and its habitat:

1. Block migration corridors.
2. Changes in flow patterns, reduced peak flows and increased base flows.
3. Release cold water, making temperature regimes less than optimal.
4. Change river habitat into lake habitat.
5. Retain sediment that is important for forming and maintaining backwater habitats.

In the Upper Basin, 435 miles of Colorado pikeminnow habitat has been lost by reservoir inundation from Flaming Forge Reservoir on the Green River, Lake Powell on the Colorado River, and Navajo Reservoir on the San Juan River. Cold water releases from these dams have eliminated suitable habitat for native fishes, including Colorado pikeminnow, from river reaches downstream for approximately 50 miles below Flaming Gorge Dam and Navajo Dam. In addition to main stem dams, many dams and water diversion structures occur in and upstream from critical habitat that reduce flows and alter flow patterns, which adversely affect critical habitat. Diversion structures in critical habitat divert fish into canals and pipes where the fish are permanently lost to the river system. It is unknown how many endangered fish are lost in irrigation systems, but in some years, in some river reaches, majority of the river flow is diverted into unscreened canals. The high spring flows which maintain habitat diversity, flush sediments from spawning habitat, increase invertebrate food production, form gravel and cobble deposits important for spawning, and maintain backwater nursery habitats have been reduced by flow regulation of dams and by water diversions (McAda 2003; Muth et al. 2000).

Predation and competition from nonnative fishes have been clearly implicated in the population reductions or elimination of native fishes in the Colorado River Basin (Dill 1944; Osmundson and Kaeding 1989; Behnke 1980; Joseph et al. 1977; Lanigan and Berry 1979; Minckley and Deacon 1968; Meffe 1985; Propst and Bestgen 1991; Rinne 1991). Data collected by Osmundson and Kaeding (1991) indicated that during low-water years nonnative minnows capable of preying on or competing with larval endangered fishes greatly increased in numbers.

More than 50 nonnative fish species were intentionally introduced in the Colorado River Basin prior to 1980 for sportfishing, forage fish, biological control and ornamental purposes (Minckley 1982; Tyus et al. 1982; Carlson and Muth 1989). Nonnative fishes compete with native fishes in several ways. The capacity of a particular area to support aquatic life is limited by physical habitat conditions. Increasing the number of species in an area usually results in a smaller population of most species. The size of each species population is controlled by the ability of each life stage to compete for space and food resources and to avoid predation. Some life stages of nonnative fishes appear to have a greater ability to compete for space and food and to avoid predation in the existing altered habitat than do some life stages of native fishes. Tyus and Saunders (1996) cite numerous examples of both indirect and direct evidence of predation on razorback sucker eggs and larvae by nonnative species.

Threats from pesticides and pollutants include accidental spills of petroleum products and hazardous materials; discharge of pollutants from uranium mill tailings; and high selenium concentration in the water and food chain (USFWS 2002a). Accidental spills of hazardous material into critical habitat can cause immediate mortality when lethal toxicity levels are exceeded. Pollutants from uranium mill tailings cause high levels of ammonia that exceed water quality standards. High selenium levels may adversely affect reproduction and recruitment (Hamilton and Wiedmeyer 1990; Stephens et al. 1992; Hamilton and Waddell 1994; Hamilton et al. 1996; Stephens and Waddell 1998; Osmundson et al. 2000).

Life History

The following excerpt from the Colorado pikeminnow recovery goals (USFWS 2002a) provides a summary of Colorado pikeminnow life history:

> "The Colorado pikeminnow is a long-distance migrator; adults move hundreds of miles to and from spawning areas, and require long sections of river with unimpeded passage. Adults require pools, deep runs, and eddy habitats maintained by high spring flows. These high spring flows maintain channel and habitat diversity, flush sediments from spawning areas, rejuvenate food production, form gravel and cobble deposits used for spawning, and rejuvenate backwater nursery habitats. Spawning occurs after spring runoff at water temperatures typically between 18 and 23 EC. After hatching and emerging from spawning substrate, larvae drift downstream to nursery backwaters that are restructured by high spring flows and maintained by relatively stable base flows. Flow recommendations have been developed that specifically consider flow-habitat relationships in habitats occupied by Colorado pikeminnow in the Upper Basin, and were designed to enhance habitat complexity and to restore and maintain ecological processes. The following is a description of observed habitat uses in the Upper Colorado River Basin."

> "Colorado pikeminnow live in warm-water reaches of the Colorado River mainstem and larger tributaries, and require uninterrupted stream passage for spawning migrations and dispersal of young. The species is adapted to a hydrologic cycle characterized by large spring peaks of snow-melt runoff and low, relatively stable base flows. High spring flows create and maintain in-channel habitats, and reconnect floodplain and riverine habitats, a phenomenon described as the spring flood-pulse (Junk et al. 1989; Johnson et al. 1995). Throughout most of the year, juvenile, subadult, and adult Colorado pikeminnow use relatively deep, low-velocity eddies, pools, and runs that occur in nearshore areas of main river channels (Tyus and McAda 1984; Valdez and Masslich 1989; Tyus 1990, 1991; Osmundson et al. 1995). In spring, however, Colorado

pikeminnow adults use floodplain habitats, flooded tributary mouths, flooded side canyons, and eddies that are available only during high flows (Tyus 1990, 1991; Osmundson et al. 1995). Such environments may be particularly beneficial for Colorado pikeminnow because other riverine fishes gather in floodplain habitats to exploit food and temperature resources, and may serve as prey. Such low-velocity environments also may serve as resting areas for Colorado pikeminnow. River reaches of high habitat complexity appear to be preferred."

"Because of their mobility and environmental tolerances, adult Colorado pikeminnow are more widely distributed than other life stages. Distribution patterns of adults are stable during most of the year (Tyus 1990, 1991; Irving and Modde 2000), but distribution of adults changes in late spring and early summer, when most mature fish migrate to spawning areas (Tyus and McAda 1984; Tyus 1985, 1990, 1991; Irving and Modde 2000). High spring flows provide an important cue to prepare adults for migration and also ensure that conditions at spawning areas are suitable for reproduction once adults arrive. Specifically, bankfull or much larger floods mobilize coarse sediment to build or reshape cobble bars, and they create side channels that Colorado pikeminnow sometimes use for spawning (Harvey et al. 1993)."

"Colorado pikeminnow spawning sites in the Green River subbasin have been well documented. The two principal locations are in Yampa Canyon on the lower Yampa River and in Gray Canyon on the lower Green River (Tyus 1990, 1991). These reaches are 42 and 72 km long, respectively, but most spawning is believed to occur at one or two short segments within each of the two reaches. Another spawning area may occur in Desolation Canyon on the lower Green River (Irving and Modde 2000), but the location and importance of this area has not been verified. Although direct observation of Colorado pikeminnow spawning was not possible because of high turbidity, radio-telemetry indicated spawning occurred over cobble-bottomed riffles (Tyus 1990). High spring flows and subsequent post-peak summer flows are important for construction and maintenance of spawning substrates (Harvey et al. 1993). In contrast with the Green River subbasin, where known spawning sites are in canyon-bound reaches, currently suspected spawning sites in the upper Colorado River subbasin are at six locations in meandering, alluvial reaches (McAda 2003)."

"After hatching and emerging from the spawning substrate, Colorado pikeminnow larvae drift downstream to backwaters in sandy, alluvial regions, where they remain through most of their first year of life (Holden 1977; Tyus and Haines 1991; Muth and Snyder 1995). Backwaters and the physical factors that create them are vital to successful recruitment of early life stages of Colorado pikeminnow, and age-0 Colorado pikeminnow in backwaters have received much research attention (e.g., Tyus and Karp 1989; Haines and Tyus 1990; Tyus 1991; Tyus and Haines 1991; Bestgen et al. 1997). It is important to note that these backwaters are formed after cessation of spring runoff within the active channel and are not floodplain features. Colorado pikeminnow larvae occupy these in-channel backwaters soon after hatching. They tend to occur in backwaters that are large, warm, deep (average, about 0.3 m in the Green River), and turbid (Tyus and Haines 1991). Recent research (Day et al. 1999a, 1999b; Trammell and Chart

> 1999) has confirmed these preferences and suggested that a particular type of backwater is preferred by Colorado pikeminnow larvae and juveniles. Such backwaters are created when a secondary channel is cut off at the upper end, but remains connected to the river at the downstream end. These chute channels are deep and may persist even when discharge levels change dramatically. An optimal river-reach environment for growth and survival of early life stages of Colorado pikeminnow has warm, relatively stable backwaters, warm river channels, and abundant food (Muth et al. 2000)."

Population Dynamics

Preliminary population estimates presented in the Recovery Goals (USFWS 2002a) for the three Colorado pikeminnow populations (Green River Subbasin, Upper Colorado River Subbasin, San Juan River Subbasin) ranged from 6,600 to 8,900 wild adults. These numbers provided a general indication of the total wild adult population size at the time the Recovery Goals were developed; however, it also was recognized that the accuracy of the estimates vary among populations. Monitoring of Colorado pikeminnow populations is ongoing, and sampling protocols and the reliability of the population estimates are being assessed by the USFWS and cooperating entities.

Estimates of wild adult Colorado pikeminnow in the middle and lower Green River ranged from 3,100 adults in 2001 and 2,300 adults in 2003 (Bestgen et al. 2004). In the Colorado River estimates of wild adults ranged from about 450 in 1992 to about 780 in 2003. To date approximately 4,426 hatchery-produced subadult Colorado pikeminnow have been stocked into unoccupied reaches of the Colorado River in the Upper Basin. In the San Juan River an estimate of about 20 wild adults was based on data collected in the early to mid-1990s. Over 668,000 juveniles Colorado pikeminnow were stocked in the San Juan River in 2002–2004. Approximately 300,000 juveniles were stocked in the fall of 2005.

Critical Habitat

Critical habitat for the Colorado pikeminnow was designated in 1994 within the 100-year floodplain of the Colorado pikeminnow's historical range in the following area of the upper Colorado River (59 FR 13374). Colorado pikeminnow now only occur in the upper Colorado River basin (upstream of Lee Ferry just below the Glen Canyon Dam). Most of Lake Powell is not suitable habitat for Colorado pikeminnow and is not designated critical habitat. The total designated miles is 1,148 and represents 29 percent of the historical habitat for the species:

> Moffat County, Colorado. The Yampa River and its 100-year floodplain from the State Highway 394 bridge in T. 6 N., R. 91 W., section 1 (6th Principal Meridian) to the confluence with the Green River in T. 7 N., R. 103 W., section 28 (6th Principal Meridian).
>
> Uintah, Carbon, Grand, Emery, Wayne, and San Juan Counties, Utah; and Moffat County, Colorado. The Green River and its 100-year floodplain from the confluence with the Yampa River in T. 7 N., R. 103 W., section 28 (6th Principal Meridian) to the confluence with the Colorado River in T. 30 S., R. 19 E., section 7 (Salt Lake Meridian).

Rio Blanco County, Colorado; and Uintah County, Utah. The White River and its 100-year floodplain from Rio Blanco Lake Dam in T. 1 N., R. 96 W., section 6 (6th Principal Meridian) to the confluence with the Green River in T. 9 S., R. 20 E., section 4 (Salt Lake Meridian).

Delta and Mesa Counties, Colorado. The Gunnison River and its 100-year floodplain from the confluence with the Uncompahgre River in T. 15 S., R. 96 W., section 11 (6th Principal Meridian) to the confluence with the Colorado River in T. 1 S., R. 1 W., section 22 (Ute Meridian).

Mesa and Garfield Counties, Colorado; and Grand, San Juan, Wayne, and Garfield Counties, Utah. The Colorado River and its 100-year floodplain from the Colorado River Bridge at exit 90 north off Interstate 70 in T. 6 S., R. 93 W., section 16 (6th Principal Meridian) to North Wash, including the Dirty Devil arm of Lake Powell up to the full pool elevation, in T. 33 S., R. 14 E., section 29 (Salt Lake Meridian).

San Juan County, New Mexico; and San Juan County, Utah. The San Juan River and its 100-year floodplain from the State Route 371 Bridge in T. 29 N., R. 13 W., section 17 (New Mexico Meridian) to Neskahai Canyon in the San Juan arm of Lake Powell in T. 41 S., R. 11 E., section 26 (Salt Lake Meridian) up to the full pool elevation.

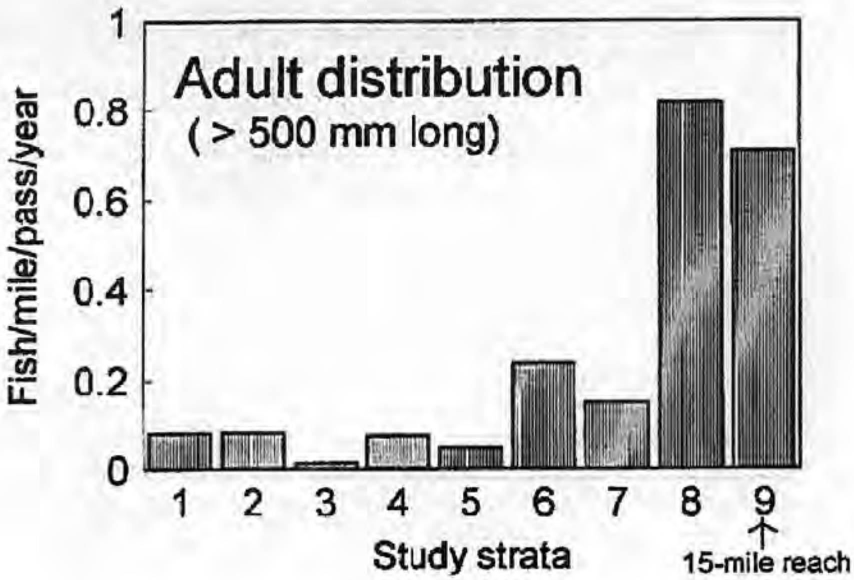
The final critical habitat rule identified water, physical habitat, and the biological environment as the Primary Constituent Elements (PCEs) of critical habitat. The water PCE was further described as including a quantity of water of sufficient quality (i.e., temperature, dissolved oxygen, lack of contaminants, nutrients, turbidity, etc.) that is delivered to a specific location in accordance with a hydrologic regime that is required for the particular life stage for each species. The physical habitat includes areas of the Colorado River system that are inhabited or potentially habitable by fish for use in spawning, nursery, feeding, and rearing, or serve as corridors between these areas. In addition to river channels, these areas also include bottom lands, side channels, secondary channels, oxbows, backwaters, and other areas in the 100-year floodplain, which when inundated provide access to spawning, nursery, feeding, and rearing habitats. The biological environment PCE includes food supply predation, and competition. Food supply is a function of nutrient supply, productivity, and availability to each life stage of the species. Predation and competition, although considered normal components of this environment, are out of balance due to introduced nonnative fish species in many areas.

Species/Critical Habitat Likely to be Affected
The Colorado pikeminnow and its critical habitat in the action area are likely to be adversely affected. The area of critical habitat likely to be affected is the Colorado River at the confluence with Mack Wash in T. 9 S., R. 103 W., section 33 (Ute Meridian), continuing down from this point of the Colorado River and its 100-year floodplain to North Wash, and the Dirty Devil arm of Lake Powell up to the full pool elevation, in T. 33 S., R. 14 E., section 29 (Salt Lake Meridian).

Analysis of Species/Critical Habitat Likely to be Affected

The Grand Valley area is occupied year round by Colorado pikeminnow and has –been identified as important habitat. The densities of adult Colorado pikeminnow are especially high in the Colorado River in the Grand Valley (Figure 1). The Colorado River in the Grand Valley is divided into two reaches: the 15-mile reach (above the confluence of the Gunnison River) and the 18-mile reach (below the confluence of the Gunnison River) shown as stratum 8 and 9 in Figure 1. The proposed project site is within the 18-mile reach (strata 8).

Figure 1. Distribution of adult Colorado pikeminnow (>500 mm long) in the Colorado River. Catch rates (fish per mile) were averaged across sampling (electrofishing and trammel netting) passes in each year and these values from five years (1991-1994 and 1998) were averaged. See Osmundson and Burnham (1998) for sampling methodology and Osmundson (1996) for strata locations.



Radio-telemetry studies show upstream and downstream movement of adult Colorado pikeminnow in the main stem Colorado River (McAda and Kaeding 1991). The most dramatic movement was exhibited by a fish implanted with a radio transmitter at Gypsum Canyon in upper Lake Powell on April 5, 1982. The fish was contacted next in the lower Cataract Canyon area on July 9, 1982. The next contact was made above the Black Rocks area of Ruby Canyon, some 160 miles upstream. The movement was accomplished in 41 days and is believed to be related to spawning. At the end of September 1982, this fish was located in the 15-mile reach (river mile 178), nearly 200 river miles from the furthest documented downstream location. Other radio-tagged fish in the Colorado River have not displayed such dramatic migratory behavior. Radio-telemetry studies conducted during 1982-1989, which focused on upstream reaches of the Colorado River in and around the Grand Valley, provide the best indication of use of the 15-mile reach above the confluence of the Gunnison River. Movement of these fish during a field season was generally limited to 25-30 miles (Osmundson and Kaeding 1989, McAda and Kaeding 1991).

During four years (1982-1985) of larval sampling throughout the Grand Valley, 100 larval pikeminnow were collected with fine-mesh hand nets from the two Colorado River reaches immediately upstream and downstream of its confluence with the Gunnison River (McAda and Kaeding 1991). Although the sampling effort was similar in the two river reaches, 98 percent of the larval captures occurred downstream of the Gunnison River confluence. Only two (2 percent) of the larvae were collected from the upstream reach. These observations may indicate that most fish were spawned in the downstream reach or that the larvae were deposited in the upstream reach and drifted downstream to the area where most of the captures were recorded. In 1995, drift nets set in the lower portion of the 15-mile reach captured three Colorado pikeminnow larvae (Anderson 1998).

A total of 122 Colorado pikeminnow were collected in the 31-mile reach downstream of the confluence of the Gunnison River during 1982-1996 (McAda and Ryel 1999). The 1982-1984 catch rate of young-of-year Colorado pikeminnow in the 10-mile reach immediately downstream of the confluence of the Gunnison River (river miles 160-170) warranted classification of this reach as a "Young-of-Year Nursery Area" by the Basin Biology Subcommittee (USFWS 1984).

Catch rates of adult (> 500 mm long) Colorado pikeminnow in the 15- and 18-mile reaches of the Grand Valley are significantly higher than in any other portion of the Colorado River (Figure 1). In the 15-mile reach, adults are most abundant during spring in a 1.3-mile segment between river miles 174.4 and 175.7, particularly in two gravel-pit ponds that were accessible during high flows. Some of the pikeminnow captured from one pond in 1986 were well tuberculated by June 3, when nearby river temperatures were only 10-13 EC (L. Kaeding pers. comm.). It has been hypothesized by some investigators that additional thermal units, above those provided in the mainstream, are important in increasing annual growth rates and perhaps in gonadal maturation. If this is true, then access to these sheltered off-channel pools may be very important in increasing rates of survival and successful spawning in the upper reaches of the Colorado River. Historically, bottomlands that routinely flooded during the spring runoff period would have provided these warm productive habitats; in recent years, flooded gravel pits may provide the only comparable habitat.

The river downstream of the Grand Valley supports adult Colorado pikeminnow, in fact, the entire river, from the confluence with the Green River upstream to Palisade, Colorado, provides important habitat for sub- and young adults. The primary importance of reaches downstream of the Grand Valley is in providing nursery areas for larvae and rearing areas for juveniles. Concentrations of larvae and young-of-year occur in backwaters in the 65-mile, low-gradient reach between Moab, Utah and the confluence with the Green River (McAda et al. 1994). These backwaters are especially important during the Colorado pikeminnow's critical first year of life. Juveniles dwell in these downstream reaches until they are five or more years old. Then many begin extensive upstream migrations seeking habitats more suited to needs of subadults and adults (Osmundson et al. 1998).

RAZORBACK SUCKER

Species Description

Like all suckers (family Catastomidae, meaning "down mouth"), the razorback sucker has a ventral mouth with thick lips covered with papillae and no scales on its head. In general, suckers are bottom browsers, sucking up or scraping off small invertebrates, algae, and organic matter with their fleshy, protrusible lips (Moyle 1976). The razorback sucker is the only sucker with an abrupt sharp-edged dorsal keel behind its head. The keel becomes more massive with age. The head and keel are dark, the back is olive-colored, the sides are brownish or reddish, and the abdomen is yellowish white (Sublette et al. 1990). Adults often exceed 3 kilograms (6 pounds) in weight and 600 millimeters (2 feet) in length. Like Colorado pikeminnow, razorback suckers are long-lived, living 40-plus years.

Status and Distribution

On March 14, 1989, the USFWS was petitioned to conduct a status review of the razorback sucker. Subsequently, the razorback sucker was designated as endangered under a final rule published on October 23, 1991 (56 FR 13374). The final rule stated "Little evidence of natural recruitment has been found in the past 30 years, and numbers of adult fish captured in the last 10 years demonstrate a downward trend relative to historic abundance. Significant changes have occurred in razorback sucker habitat through diversion and depletion of water, introduction of nonnative fishes, and construction and operation of dams" (56 FR 13374). Recruitment of razorback suckers to the population continues to be a problem.

Historically, razorback suckers were found in the mainstem Colorado River and major tributaries in Arizona, California, Colorado, Nevada, New Mexico, Utah, Wyoming, and in Mexico (Ellis 1914; Minckley 1983). Bestgen (1990) reported that this species was once so numerous that it was commonly used as food by early settlers and, further, that commercially marketable quantities were caught in Arizona as recently as 1949. In the Upper Basin, razorback suckers were reported in the Green River to be very abundant near Green River, Utah, in the late 1800s (Jordan 1891). An account in Osmundson and Kaeding (1989) reported that residents living along the Colorado River near Clifton, Colorado, observed several thousand razorback suckers during spring runoff in the 1930s and early 1940s. In the San Juan River drainage, Platania and Young (1989) relayed historical accounts of razorback suckers ascending the Animas River to Durango, Colorado, around the turn of the century.

A marked decline in populations of razorback suckers can be attributed to construction of dams and reservoirs, introduction of nonnative fishes, and removal of large quantities of water from the Colorado River system. Dams on the mainstem Colorado River and its major tributaries have segmented the river system, blocked migration routes, and changed river habitat into lake habitat. Dams also have drastically altered flows, temperatures, and channel geomorphology. These changes have modified habitats in many areas so that they are no longer suitable for breeding, feeding, or sheltering. Major changes in species composition have occurred due to the introduction of numerous nonnative fishes, many of which have thrived due to human-induced changes to the natural riverine system. These nonnative fishes prey upon and compete with razorback suckers.

Currently, the largest concentration of razorback sucker remaining in the Colorado River Basin is in Lake Mohave on the border of Arizona and California. Estimates of the wild stock in Lake

Mohave have fallen precipitously in recent years from 60,000 as late as 1991, to 25,000 in 1993 (Marsh 1993, Holden 1994), to about 9,000 in 2000 (USFWS 2002b). Until recently, efforts to introduce young razorback sucker into Lake Mohave have failed because of predation by nonnative species (Minckley et al. 1991; Clarkson et al. 1993; Burke 1994). While limited numbers of razorback suckers persist in other locations in the Lower Colorado River, they are considered rare or incidental and may be continuing to decline.

In the Upper Colorado River Basin, above Glen Canyon Dam, razorback suckers are found in limited numbers in both lentic (lake-like) and riverine environments. The largest populations of razorback suckers in the Upper Basin are found in the middle Green and lower Yampa Rivers (Tyus 1987). In the Colorado River, most razorback suckers occur in the Grand Valley area near Grand Junction, Colorado; however, they are increasingly rare. Osmundson and Kaeding (1991) reported that the number of razorback sucker captures in the Grand Junction area has declined dramatically since 1974. Between 1984 and 1990, intensive collecting effort captured only 12 individuals in the Grand Valley (Osmundson and Kaeding 1991). The wild population of razorback sucker is considered extirpated from the Gunnison River (Burdick and Bonar 1997).

Razorback suckers are in imminent danger of extirpation in the wild. As Bestgen (1990) pointed out:

> "Reasons for decline of most native fishes in the Colorado River Basin have been attributed to habitat loss due to construction of mainstream dams and subsequent interruption or alteration of natural flow and physio-chemical regimes, inundation of river reaches by reservoirs, channelization, water quality degradation, introduction of nonnative fish species and resulting competitive interactions or predation, and other man-induced disturbances (Miller 1961, Joseph et al. 1977, Behnke and Benson 1983, Carlson and Muth 1989, Tyus and Karp 1989). These factors are almost certainly not mutually exclusive, therefore it is often difficult to determine exact cause and effect relationships."

The virtual absence of any recruitment suggests a combination of biological, physical, and/or chemical factors that may be affecting the survival and recruitment of early life stages of razorback suckers. Within the Upper Basin, recovery efforts endorsed by the Recovery Program include the capture and removal of razorback suckers from all known locations for genetic analyses and development of discrete brood stocks. These measures have been undertaken to develop refugia populations of the razorback sucker from the same genetic parentage as their wild counterparts such that, if these fish are genetically unique by subbasin or individual population, then separate stocks will be available for future augmentation. Such augmentation may be a necessary step to prevent the extinction of razorback suckers in the Upper Basin.

Threats to the Species

The primary threats to razorback sucker are stream flow regulation and habitat modification; competition with and predation by nonnative fishes; and pesticides and pollutants (USFWS 2002b). The existing habitat, altered by these threats, has been modified to the extent that it impairs essential behavior patterns, such as breeding, feeding, and sheltering. The threats to razorback sucker are essentially the same threats identified for Colorado pikeminnow.

Life History

McAda and Wydoski (1980) and Tyus (1987) reported springtime aggregations of razorback suckers in off-channel habitats and tributaries; such aggregations are believed to be associated with reproductive activities. Tyus and Karp (1990) and Osmundson and Kaeding (1991) reported off-channel habitats to be much warmer than the mainstem river and that razorback suckers presumably moved to these areas for feeding, resting, sexual maturation, spawning, and other activities associated with their reproductive cycle. Prior to construction of large mainstem dams and the suppression of spring peak flows, low velocity, off-channel habitats (seasonally flooded bottomlands and shorelines) were commonly available throughout the Upper Basin (Tyus and Karp 1989; Osmundson and Kaeding 1991). Dams changed riverine ecosystems into lakes by impounding water, which eliminated these off-channel habitats in reservoirs. Reduction in spring peak flows eliminates or reduces the frequency of inundation of off-channel habitats. The absence of these seasonally flooded riverine habitats is believed to be a limiting factor in the successful recruitment of razorback suckers in their native environment (Tyus and Karp 1989; Osmundson and Kaeding 1991). Wydoski and Wick (1998) identified starvation of larval razorback suckers due to low zooplankton densities in the main channel and loss of floodplain habitats which provide adequate zooplankton densities for larval food as one of the most important factors limiting recruitment.

While razorback suckers have never been directly observed spawning in turbid riverine environments within the Upper Basin, captures of ripe specimens (in spawning condition), both males and females, have been recorded (Valdez et al. 1982a; McAda and Wydoski 1980; Tyus 1987; Osmundson and Kaeding 1989; Tyus and Karp 1989; Tyus and Karp 1990; Osmundson and Kaeding 1991; Platania 1990) in the Yampa, Green, Colorado, and San Juan Rivers. Sexually mature razorback suckers are generally collected on the ascending limb of the hydrograph from mid-April through June and are associated with coarse gravel substrates (depending on the specific location).

Outside of the spawning season, adult razorback suckers occupy a variety of shoreline and main channel habitats including slow runs, shallow to deep pools, backwaters, eddies, and other relatively slow velocity areas associated with sand substrates (Tyus 1987; Tyus and Karp 1989; Osmundson and Kaeding 1989; Valdez and Masslich 1989; Osmundson and Kaeding 1991; Tyus and Karp 1990).

Habitat requirements of young and juvenile razorback suckers in the wild are not well known, particularly in native riverine environments. Prior to 1991, the last confirmed documentation of a razorback sucker juvenile in the Upper Basin was a capture in the Colorado River near Moab, Utah (Taba et al. 1965). In 1991, two early juvenile (36.6 and 39.3 millimeters total length) razorback suckers were collected in the lower Green River near Hell Roaring Canyon (Gutermuth et al. 1994). Juvenile razorback suckers have been collected in recent years from Old Charley Wash, a wetland adjacent to the Green River (Modde 1996). Between 1992 and 1995 larval razorback suckers were collected in the middle and lower Green River and within the Colorado River inflow to Lake Powell (Muth 1995). In 2002, eight larval razorback suckers were collected in the Gunnison River (Osmundson 2002b). No young razorback suckers have been collected in recent times in the Colorado River.

Population Dynamics

The largest concentration of razorback suckers in the Upper Basin exists in low-gradient flat-water reaches of the middle Green River between and including the lower few miles of the Duchesne River and the Yampa River (Tyus 1987; Tyus and Karp 1990; Muth 1995; Modde and Wick 1997; Muth et al. 2000). This area includes the greatest expanse of floodplain habitat in the Upper Colorado River Basin, between Pariette Draw at River Mile (RM) 238 and the Escalante Ranch at RM 310 (Irving and Burdick 1995).

Lanigan and Tyus (1989) used a demographically closed model with capture-recapture data collected from 1980 to 1988 and estimated that the middle Green River population consisted of about 1,000 adults (mean, 948; 95 percent confidence interval, 758–1,138). Based on a demographically open model and capture-recapture data collected from 1980 to 1992, Modde et al. (1996) estimated the number of adults in the middle Green River population at about 500 fish (mean, 524; 95 percent confidence interval, 351–696). That population had a relatively constant length frequency distribution among years (most frequent modes were in the 505-515 millimeters total length interval) and an estimated annual survival rate of 71 percent. Bestgen et al. (2002) estimated the current population of wild razorback sucker in the middle Green River to be much lower than earlier estimates -- about 100 -- based on data collected in 1998 and 1999. There are no current population estimates of razorback sucker in the remainder of the upper Colorado River basin due to low numbers captured in recent years.

From 1995 through 2004, 89,730 subadult razorback sucker were stocked into the Green and Colorado Subbasins. Monitoring and evaluation of stocked fish is ongoing. Approximately 10,850 subadult and adult razorback sucker have been stocked in the San Juan River and reproduction has been documented through the collection of larvae every year since 1998. Juvenile razorback sucker were found in the San Juan River in 2002 and 2003.

Critical Habitat

Critical habitat was designated in 1994 within the 100-year floodplain of the razorback sucker's historical range in the following area of the upper Colorado River (59 FR 13374). The PCEs are the same as critical habitat for Colorado pikeminnow described previously, as is the status of the PCEs. We designated 15 reaches of the Colorado River system as critical habitat for the razorback sucker. These reaches total 1,724 miles as measured along the center line of the river within the subject reaches. The designation represents approximately 49 percent of the historical habitat for the species and includes reaches of the Green, Yampa, Duchesne, Colorado, White, Gunnison, and San Juan Rivers:

> Moffat County, Colorado. The Yampa River and its 100-year floodplain from the mouth of Cross Mountain Canyon in T. 6 N., R. 98 W., section 23 (6th Principal Meridian) to the confluence with the Green River in T. 7 N., R. 103 W., section 28 (6th Principal Meridian).
>
> Uintah County, Utah; and Moffat County, Colorado. The Green River and its 100-year floodplain from the confluence with the Yampa River in T. 7 N., R. 103 W., section 28 (6th Principal Meridian) to Sand Wash in T. 11 S., R. 18 E., section 20 (6th Principal Meridian).

Uintah, Carbon, Grand, Emery, Wayne, and San Juan Counties, Utah. The Green River and its 100-year floodplain from Sand Wash at RM 96 at T. 11 S., R. 18 E., section 20 (6th Principal Meridian) to the confluence with the Colorado River in T. 30 S., R. 19 E., section 7 (6th Principal Meridian).

Uintah County, Utah. The White River and its 100-year floodplain from the boundary of the Uintah and Ouray Indian Reservation at RM 18 in T. 9 S., R. 22 E., section 21 (Salt Lake Meridian) to the confluence with the Green River in T. 9 S., R 20 E., section 4 (Salt Lake Meridian).

Uintah County, Utah. The Duchesne River and its 100-year floodplain from RM 2.5 in T. 4 S., R. 3 E., section 30 (Salt Lake Meridian) to the confluence with the Green River in T. 5 S., R. 3 E., section 5 (Uintah Meridian).

Delta and Mesa Counties, Colorado. The Gunnison River and its 100-year floodplain from the confluence with the Uncompahgre River in T. 15 S., R. 96 W., section 11 (6th Principal Meridian) to Redlands Diversion Dam in T. 1 S., R. 1 W., section 27 (Ute Meridian).

Mesa and Garfield Counties, Colorado. The Colorado River and its 100-year floodplain from Colorado River Bridge at exit 90 north off Interstate 70 in T. 6 S., R. 93 W., section 16 (6th Principal Meridian) to Westwater Canyon in T. 20 S., R. 25 E., section 12 (Salt Lake Meridian) including the Gunnison River and its 100-year floodplain from the Redlands Diversion Dam in T. 1 S., R. 1 W., section 27 (Ute Meridian) to the confluence with the Colorado River in T. 1 S., R. 1 W., section 22 (Ute Meridian). The subject Project occurs within this reach of critical habitat.

Grand, San Juan, Wayne, and Garfield Counties, Utah. The Colorado River and its 100-year floodplain from Westwater Canyon in T. 20 S., R. 25 E., section 12 (Salt Lake Meridian) to full pool elevation, upstream of North Wash, and including the Dirty Devil arm of Lake Powell in T. 33 S., R. 14 E., section 29 (Salt Lake Meridian).

San Juan County; and Utah, San Juan County, New Mexico. The San Juan River and its 100-year floodplain from the Hogback Diversion in T. 29 N., R. 16 W., section 9 (New Mexico Meridian) to the full pool elevation at the mouth of Neskahai Canyon on the San Juan arm of Lake Powell in T. 41 S., R. 11 E., section 26 (Salt Lake Meridian).

Species/Critical Habitat Likely to be Affected
The razor back sucker and its critical habitat in Mesa County, Colorado and Grand, San Juan, Wayne, and Garfield Counties, Utah, as described above, are likely to be adversely affected by the subject project.

HUMPBACK CHUB

Species Description

The humpback chub is a medium-sized freshwater fish (less than 500 mm) of the minnow family. The adults have a pronounced dorsal hump, a narrow flattened head, a fleshy snout with an inferior-subterminal mouth, and small eyes. It has silvery sides with a brown or olive-colored back.

The humpback chub is endemic to the Colorado River Basin and is part of a native fish fauna traced to the Miocene epoch in fossil records (Miller 1946; Minckley et al. 1986). Humpback chub remains have been dated to about 4000 B.C., but the fish was not described as a species until the 1940s (Miller 1946), presumably because of its restricted distribution in remote white water canyons (USFWS 1990b). Because it was described only after considerable changes in the river system had occurred, the original distribution of this species is not known. The humpback chub was listed as endangered on March 11, 1967.

Status and Distribution

Until the 1950s, the humpback chub was known only from Grand Canyon. During surveys in the 1950s and 1960s humpback chub were found in the upper Green River including specimens from Echo Park, Island Park, and Swallow Canyon (Smith 1960; Vanicek et al. 1970). Individuals also were reported from the lower Yampa River (Holden and Stalnaker 1975), the White River in Utah (Sigler and Miller 1963), Desolation Canyon of the Green River (Holden and Stalnaker 1970), and the Colorado River near Moab (Sigler and Miller 1963).

Today the largest populations of this species occur in the Little Colorado and Colorado Rivers in the Grand Canyon, and in Black Rocks and Westwater Canyon in the upper Colorado River. Other populations have been reported in De Beque Canyon of the Colorado River, Desolation and Gray Canyons of the Green River, and the Yampa and Whirlpool Canyons in Dinosaur National Monument (USFWS 1990b). One individual was recently captured in the Gunnison River in a canyon-bound reach at RM 22 (Burdick 1995).

Although historic data are limited, the apparent range-wide decline in humpback chubs is likely due to a combination of factors including alteration of river habitats by reservoir inundation, changes in stream discharge and temperature, competition with and predation by introduced fish species, and other factors such as changes in food resources resulting from stream alterations (USFWS 1990b).

Present concentrations of humpback chub in the Upper Basin occur in canyon-bound river reaches ranging in length from 3.7 kilometers (Black Rocks) to 40.5 kilometers (Desolation and Gray Canyons). Humpback chubs are distributed throughout most of Black Rocks and Westwater Canyons (12.9 km), and in or near whitewater reaches of Cataract Canyon (20.9 kilometers), Desolation and Gray Canyons (65.2 kilometers), and Yampa Canyon (44.3 kilometers), with populations in the separate canyon reaches ranging from 400 to 5,000 adults (see population dynamics). The Utah Division of Wildlife Resources has monitored the fish community in Desolation and Gray Canyons since 1989 and has consistently reported captures of age-0, juvenile, and adult *Gila,* including humpback chub, indicating a reproducing population (Chart and Lentsch 1999b). Distribution of humpback chubs within Whirlpool and

Split Mountain Canyons is not presently known but is believed that numbers of humpback chub in these sections of the Green River are low.

The Yampa River is the only tributary to the Green River presently known to support a reproducing humpback chub population. Between 1986 and 1989, Karp and Tyus (1990) collected 130 humpback chubs from Yampa Canyon and indicated that a small but reproducing population was present. Continuing captures of juveniles and adults within Dinosaur National Monument indicate that a population persists in Yampa Canyon (T. Modde, USFWS, pers. comm.). Small numbers of humpback chub also have been reported in Cross Mountain Canyon on the Yampa River and in the Little Snake River about 10 kilometers upstream of its confluence with the Yampa River (Wick et al. 1981; Hawkins et al. 1996).

Threats to the Species

The primary threats to humpback chub are stream flow regulation and habitat modification; competition with and predation by nonnative fishes; parasitism; hybridization with other native *Gila* species; and pesticides and pollutants (USFWS 2002c). The existing habitat, altered by these threats, has been modified to the extent that it impairs essential behavior patterns, such as breeding, feeding, and sheltering. The threats to humpback chub in relation to flow regulation and habitat modification, predation by nonnative fishes, and pesticides and pollutants are essentially the same threats identified for Colorado pikeminnow.

The humpback chub population in the Grand Canyon is threatened by predation from nonnative trout in the Colorado River below Glen Canyon Dam. This population also is threatened by the Asian tapeworm reported in humpback chub in the Little Colorado River (USFWS 2002c). No Asian tapeworms have been reported in the Upper Basin populations.

Hybridization with roundtail chub (*Gila robusta*) and bonytail, where they occur with humpback chub, is recognized as a threat to humpback chub. A larger proportion of roundtail chub have been found in Black Rocks and Westwater Canyon during low flow years (Kaeding et al. 1990; Chart and Lentsch 2000), which increase the chances for hybridization.

Life History

Unlike Colorado pikeminnow and razorback sucker, which are known to make extended migrations of up to several hundred miles to spawning areas in the Green and Yampa Rivers, humpback chubs in the Green River do not appear to make extensive migrations (Karp and Tyus 1990). Radio-telemetry and tagging studies on other humpback chub populations have revealed strong fidelity by adults for specific locations with little movement to areas outside of home canyon regions. Humpback chubs in Black Rocks (Valdez and Clemmer 1982), Westwater Canyon (Chart and Lentsch 1999a), and Desolation and Gray Canyons (Chart and Lentsch 1999b) do not migrate to spawn.

Generally, humpback chub show fidelity for canyon reaches and move very little (Miller et al. 1982a; Archer et al. 1985; Burdick and Kaeding 1985; Kaeding et al. 1990). Movements of adult humpback chub in Black Rocks on the Colorado River were essentially restricted to a 1-mile reach. These results were based on the recapture of Carlin-tagged fish and radio-telemetry studies conducted from 1979 to 1981 (Valdez et al. 1982b) and 1983 to 1985 (Archer et al. 1985; USFWS 1986; Kaeding et al. 1990).

In the Green River and upper Colorado River, humpback chubs spawned in spring and summer as flows declined shortly after the spring peak (Valdez and Clemmer 1982; Valdez et al. 1982; Kaeding and Zimmerman 1983; Tyus and Karp 1989; Karp and Tyus 1990; Chart and Lentsch 1999a, 1999b). Similar spawning patterns were reported from Grand Canyon (Kaeding and Zimmerman 1983; Valdez and Ryel 1995, 1997). Little is known about spawning habitats and behavior of humpback chub. Although humpback chub are believed to broadcast eggs over mid-channel cobble and gravel bars, spawning in the wild has not been observed for this species. Gorman and Stone (1999) reported that ripe male humpback chubs in the Little Colorado River aggregated in areas of complex habitat structure (i.e., matrix of large boulders and travertine masses combined with chutes, runs, and eddies, 0.5–2.0 meters deep) and were associated with deposits of clean gravel.

Backwaters, eddies, and runs have been reported as common capture locations for young-of-year humpback chub (Valdez and Clemmer 1982). These data indicate that in Black Rocks and Westwater Canyon, young utilize shallow areas. Habitat suitability index curves developed by Valdez et al. (1990) indicate young-of-year prefer average depths of 2.1 feet with a maximum of 5.1 feet. Average velocities were reported at 0.2 feet per second. Valdez et al. (1982b), Wick et al. (1979), and Wick et al. (1981) found adult humpback chub in Black Rocks and Westwater Canyons in water averaging 50 feet in depth with a maximum depth of 92 feet. In these localities, humpback chub were associated with large boulders and steep cliffs.

Population Dynamics

The humpback chub Recovery Goals (USFWS 2002c) provided the following preliminary population estimates for adults in the six populations:

* Black Rocks, Colorado River, Colorado - 900–1,500
* Westwater Canyon, Colorado River, Utah - 2,000–5,000
* Yampa Canyon, Yampa River, Colorado - 400–600
* Desolation/Gray Canyons, Green River, Utah - 1,500
* Cataract Canyon, Colorado River, Utah - 500
* Grand Canyon, Colorado River and Little Colorado River, Arizona - 2,000–4,700

Monitoring humpback chub populations is ongoing, and sampling protocols and reliability of population estimates are being assessed by the USFWS and cooperating entities. The demographic criteria of the Recovery Goals (USFWS 2002c) for downlisting the humpback chub to "threatened," call for maintaining the six populations and at least one core population in both the Upper and Lower Colorado River Basins of >2,100 adults that are self-sustaining with recruitment.

Critical Habitat

Critical habitat was designated in 1994 within humpback chub historical range in the following sections of the upper Colorado River (59 FR 13374). The PCEs are the same as those described for the Colorado pikeminnow, as is the status of the PCEs. We designated seven reaches of the Colorado River system for a total of 379 miles as measured along the center line of the subject reaches. The designation represents approximately 28 percent of the suspected historical habitat of the species and includes reaches in the Colorado, Green, and Yampa Rivers in the Upper Basin:

Moffat County, Colorado. The Yampa River from the boundary of Dinosaur National Monument in T. 6 N., R. 99 W., section 27 (6th Principal Meridian) to the confluence with the Green River in T. 7 N., R. 103 W., section 28 (6th Principal Meridian).

Uintah County; and Colorado, Moffat County, Utah. The Green River from the confluence with the Yampa River in T. 7 N., R. 103 W., section 28 (6th Principal Meridian) to the southern boundary of Dinosaur National Monument in T. 6 N., R. 24 E., section 30 (Salt Lake Meridian).

Uintah and Grand Counties, Utah. The Green River (Desolation and Gray Canyons) from Sumner's Amphitheater in T. 12 S., R. 18 E., section 5 (Salt Lake Meridian) to Swasey's Rapid in T. 20 S., R. 16 E., section 3 (Salt Lake Meridian).

Grand County; and Colorado, Mesa County, Utah. The Colorado River from Black Rocks in T. 10 S., R. 104 W., section 25 (6th Principal Meridian) to Fish Ford in T. 21 S., R. 24 E., section 35 (Salt Lake Meridian).

Garfield and San Juan Counties, Utah. The Colorado River from Brown Betty Rapid in T. 30 S., R. 18 E., section 34 (Salt Lake Meridian) to Imperial Canyon in T. 31 S., R. 17 E., section 28 (Salt Lake Meridian).

Species/Critical Habitat Likely to be Affected
The humpback chub and its critical habitat, as described below, are likely to be adversely affected by the subject Project. Although the Project does not occur within the designated critical habitat for the humpback chub, the Project depletion would adversely affect critical habitat by reducing the amount of water flowing into designated critical habitat:

Grand County, Utah; and Mesa County, Colorado. The Colorado River from Black Rocks in T. 10 S., R. 104 W., section 25 (6th Principal Meridian) to Fish Ford in T. 21 S., R. 24 E., section 35 (Salt Lake Meridian).

Garfield and San Juan Counties, Utah. The Colorado River from Brown Betty Rapid in T. 30 S., R. 18 E., section 34 (Salt Lake Meridian) to Imperial Canyon in T. 31 S., R. 17 E., section 28 (Salt Lake Meridian).

BONYTAIL

Species Description
Bonytail are medium-sized (less than 600 mm) fish in the minnow family. Adult bonytail are gray or olive-colored on the back with silvery sides and a white belly. The adult bonytail has an elongated body with a long, thin caudal peduncle. The head is small and compressed compared to the rest of the body. The mouth is slightly overhung by the snout and there is a smooth low hump behind the head that is not as pronounced as the hump on a humpback chub.

Status and Distribution
The bonytail is the rarest native fish in the Colorado River. Little is known about its specific habitat requirements or cause of decline, because the bonytail was extirpated from most of its historic range prior to extensive fishery surveys. It was listed as endangered on April 23, 1980.

Currently, no documented self-sustaining populations exist in the wild. Formerly reported as widespread and abundant in mainstem rivers (Jordan and Evermann 1896), its populations have been greatly reduced. Remnant populations presently occur in the wild in low numbers in Lake Mohave and several fish have been captured in Lake Powell and Lake Havasu (USFWS 2002d). The last known riverine area where bonytail were common was the Green River in Dinosaur National Monument, where Vanicek (1967) and Holden and Stalnaker (1970) collected 91 specimens during 1962-1966. From 1977 to 1983, no bonytail were collected from the Colorado or Gunnison Rivers in Colorado or Utah (Wick et al. 1979, 1981; Valdez et al. 1982a, 1982b; Miller et al. 1984). However, in 1984, a single bonytail was collected from Black Rocks on the Colorado River (Kaeding et al. 1986). Several suspected bonytail were captured in Cataract Canyon in 1985-1987 (Valdez 1990). Current stocking plans for bonytail identify the middle Green River and the Yampa River in Dinosaur National Monument as the highest priority for stocking in Colorado and the plan calls for 2,665 fish to be stocked per year over the next 6 years (Nesler et al. 2003).

Threats to the species include stream flow regulation, habitat modification, predation by introduced nonnative fish species, hybridization, and pesticides and other pollutants (USFWS 2002d).

Threats to the Species

The primary threats to bonytail are stream flow regulation and habitat modification; competition with and predation by nonnative fishes; hybridization with other native *Gila* species; and pesticides and pollutants (USFWS 2002d). The existing habitat, altered by these threats, has been modified to the extent that it impairs essential behavior patterns, such as breeding, feeding, and sheltering. The threats to bonytail in relation to flow regulation and habitat modification, predation by nonnative fishes, and pesticides and pollutants are essentially the same threats identified for Colorado pikeminnow. Threats to bonytail in relation to hybridization are essentially the same threats identified for humpback chub.

Life History

The bonytail is considered a species that is adapted to mainstem rivers, where it has been observed in pools and eddies (Vanicek 1967; Minckley 1973). Spawning of bonytail has never been observed in a river, but ripe fish were collected in Dinosaur National Monument during late June and early July suggesting that spawning occurred at water temperatures of about 18 EC (Vanicek and Kramer 1969). Similar to other closely related *Gila* species, bonytail probably spawn in rivers in spring over rocky substrates; spawning has been observed in reservoirs over rocky shoals and shorelines.

Population Dynamics

Bonytail are so rare that it is currently not possible to conduct population estimates. A stocking program is being implemented to reestablish populations in the upper Colorado River basin. From 1996 through 2004, 44,472 subadult bonytail were stocked in the Green and upper Colorado River Subbasins. The Recovery Goals (USFWS 2002d) call for reestablished populations in the Green River and upper Colorado River subbasins, each with >4,400 adults that are self-sustaining with recruitment.

Critical Habitat

Critical habitat was designated in 1994 within the bonytail's historical range in the following sections of the upper Colorado River (59 FR 13374). The PCEs are the same as those described for the Colorado pikeminnow, as is the status of the PCEs. We designated seven reaches of the Colorado River system as critical habitat for the bonytail chub. These reaches total 312 miles as measured along the center line of the subject reaches, representing approximately 14 percent of the historical habitat of the species. Critical habitat includes portions of the Colorado, Green, and Yampa Rivers in the Upper Basin:

> Moffat County, Colorado. The Yampa River from the boundary of Dinosaur National Monument in T. 6 N., R. 99 W., section 27 (6th Principal Meridian) to the confluence with the Green River in T. 7 N., R. 103 W., section 28 (6th Principal Meridian).
>
> Uintah County; and Colorado, Moffat County, Utah. The Green River from the confluence with the Yampa River in T. 7 N., R. 103 W., section 28 (6th Principal Meridian) to the boundary of Dinosaur National Monument in T. 6 N., R. 24 E., section 30 (Salt Lake Meridian).
>
> Uintah and Grand Counties, Utah. The Green River (Desolation and Gray Canyons) from Sumner's Amphitheater in T. 12 S., R. 18 E., section 5 (Salt Lake Meridian) to Swasey's Rapid (RM 12) in T. 20 S., R. 16 E., section 3 (Salt Lake Meridian).
>
> Grand County, Utah; and Mesa County, Colorado. The Colorado River from Black Rocks (RM 137) in T. 10 S., R. 104 W., section 25 (6th Principal Meridian) to Fish Ford in T. 21 S., R. 24 E., section 35 (Salt Lake Meridian).
>
> Garfield and San Juan Counties, Utah. The Colorado River from Brown Betty Rapid in T. 30 S., R. 18 E., section 34 (Salt Lake Meridian) to Imperial Canyon in T. 31 S., R. 17 E., section 28 (Salt Lake Meridian).

Species/Critical Habitat Likely to be Affected

The bonytail and its critical habitat, as described below, are likely to be adversely affected by the subject Project. Although the Project does not occur within the designated critical habitat for the bonytail, the Project depletion would adversely affect critical habitat by reducing the amount of water flowing into designated critical habitat.

> Grand County, Utah; and Mesa County, Colorado. The Colorado River from Black Rocks (RM 137) in T. 10 S., R. 104 W., section 25 (6th Principal Meridian) to Fish Ford in T. 21 S., R. 24 E., section 35 (Salt Lake Meridian).
>
> Garfield and San Juan Counties, Utah. The Colorado River from Brown Betty Rapid in T. 30 S., R. 18 E., section 34 (Salt Lake Meridian) to Imperial Canyon in T. 31 S., R. 17 E., section 28 (Salt Lake Meridian).

ENVIRONMENTAL BASELINE

The environmental baseline includes the past and present impacts of all Federal, State, and private actions and other human activities in the action area; the anticipated impacts of all proposed Federal projects in the action area that have already undergone formal section 7 consultation; and the impact of State or private actions contemporaneous with the consultation process.

In formulating this opinion, the USFWS considered adverse and beneficial effects likely to result from cumulative effects of future State and private activities that are reasonably certain to occur within the Project area, along with the direct and indirect effects of the Project and impacts from actions that are part of the environmental baseline (50 CFR 402.02 and 402.14 (g)(3)).

STATUS OF THE SPECIES IN THE ACTION AREA

Estimates of wild adult Colorado pikeminnow in the upper Colorado River (from Palisade, Colorado to Lake Powell) were approximately 780 fish in 2003 (Bestgen et al. 2004). This population estimate includes the Colorado River above the confluence with the Dolores River, whereas the action area does not include this reach. However, fish can freely swim into this reach from the Colorado River below the confluence, so the upper Colorado River (including the Gunnison River) is considered one population. Estimates of wild adult Colorado pikeminnow in the middle and lower Green River were approximately 2,300 in 2003 (Bestgen et al. 2004). In the early to mid 1990s, an estimated 20 wild adult Colorado pikeminnow occurred in the San Juan River. However, the San Juan River has been stocked with juvenile Colorado pikeminnow over the last decade, including 66,800 between 2002-2004.

The action area includes the largest concentration of razorback suckers in the Upper Colorado River Basin, found in low-gradient flat-water reaches of the middle Green River between and including the lower few miles of the Duchesne River and the Yampa River. Most recent estimates approximate the population to be 100 adults, based on data collected in 1998 and 1999 (Bestgen et al. 2002). There are no current population estimates of razorback sucker in the remainder of the upper Colorado River basin due to low numbers captured in recent years.

Humpback chub occur in Westwater Canyon, Desolation/Gray Canyons and Cataract Canyon, but not in other river reaches in the action area. Preliminary population estimates in 2002 approximate 2,000 to 5,000 humpback chub in Westwater Canyon, 1,500 in Desolation/Gray Canyons, and 500 in Cataract Canyon (USFWS 2002c). Bonytail are so rare that it is currently not possible to conduct population estimates. However, the action area includes the middle Green River, which is part of the current stocking program area (along with the Yampa in Dinosaur National Monument). Plan calls for 2,665 fish to be stocked in this area per year from 2005 to 2011 (Nesler et al. 2003).

FACTORS AFFECTING THE SPECIES ENVIRONMENT WITHIN THE ACTION AREA

CRITICAL HABITAT - COLORADO RIVER FROM GREEN RIVER CONFLUENCE TO LAKE POWELL
Historically, the Colorado River produced high spring turbid flows that maintained critical habitat by inundating floodplains, maintaining side channels, and creating backwaters. Between the confluence with the Green River and Lake Powell the Colorado River flows through Cataract

Canyon where the river cuts deeply through steep canyons and talus slopes and has deep swift runs, major rapids, large eddies, and pools. Large angular rock and steep gradient have created approximately 13 miles of rapids before the river flows into the upper end of Lake Powell where it resembles a large, deep, slow-flowing river with high sandstone walls.

The Colorado River below the confluence with the Gunnison River flows approximately 18 miles through the Grand Valley. In the Grand Valley reach, numerous gravel pit ponds occupy the floodplain and many of the river banks have been armored with riprap. The river channel is braided around vegetated gravel islands and the habitat consists of runs, riffles, eddies, backwaters, and side channels.

The Colorado River downstream of the Grand Valley flows through 29 miles of Horsethief and Ruby Canyons with limited floodplain areas and shear sandstone walls. Black Rocks is a mile-long reach of river that flows through a geologic upthrust of metamorphic gneiss that confines the river creating a deep channel with strong eddies and turbulent currents. Five miles downstream, the river flows through Westwater Canyon for 14 miles. Westwater Canyon also is formed by an upthrust of black rock that creates unique habitat conditions similar to Black Rocks but with significant whitewater rapids. This reach encompasses critical habitat for humpback chub and bonytail from upstream of Black Rocks to below Westwater Canyon. Below Westwater Canyon the river flows through shallow canyons and open valleys and then through steep sandstone canyons above and below Moab.

Habitats are comprised of deep runs and pools with several rapids formed by side canyons. Many backwaters with sand/silt substrate occur between Moab and the confluence with the Green River during low flow periods (Valdez et al. 1982b). Between the confluence with the Green River and Lake Powell the Colorado River flows through Cataract Canyon where the river has deep swift runs, major rapids, large eddies, and pools. Lake Powell now inundates the lower end of Cataract Canyon where there is a transition zone between riverine and lacustrine habitat.

Primary Constituent Element – Water

Like the Green River, the quantity of water in the Colorado River has been reduced by water development projects. Any water depletions in the Green River will adversely affect the Colorado River critical habitat below the confluence through Cataract Canyon. Flow regimes have been altered significantly in the Colorado River by numerous upstream reservoirs and water projects, many of which transport large volumes of water out of the Colorado River Basin.

Flows regimes have been altered significantly in the Colorado River: in addition to the alteration caused by the Aspinall Unit, flow in the Colorado River has been altered by numerous upstream reservoirs and water projects, many of which transport large volumes of water out of the Colorado River basin.

Elevated selenium concentrations associated with irrigation drainwater were found in the Colorado River during National Irrigation Water Quality Program investigations (Butler et al. 1994, 1996; Butler and Osmundson 2000). These elevated selenium concentrations still occur in water, sediment, and biota, and continue to pose a risk to this PCE. The Colorado River below the confluence with the Gunnison to the State line and associated tributaries appear on the State of Colorado's 303(d) list of impaired waters because of selenium. Studies show that selenium concentrations in water and fish tissue are inversely related to flows; the lower the flows the higher the selenium concentrations (Osmundson et al. 2000).

Primary Constituent Element - Physical Habitat
Westwater and Cataract Canyons provide movement and migration corridors between the other relatively flat water habitats. Floodplain habitats between the canyons provide warm water, low velocity, feeding and nursery habitats. Many backwaters between Westwater Canyon and Lake Powell provide nursery habitat. The USFWS has developed flow recommendations for the Colorado River below the confluence with the Gunnison River (McAda 2003) designed to maintain spawning and backwater habitat. Under current conditions these recommended flows are achieved only in naturally wet years.

Primary Constituent Element - Biological Environment
This PCE is impaired by the presence of nonnative fishes common in this reach of the Colorado River. Nonnative fishes occupy the same backwaters that are very important for young Colorado pikeminnow and razorback sucker. Largemouth bass (*Micropterus salmoides*) and green sunfish (*Lepomis cyanellus*) are the most common large-bodied fishes that occupy backwater habitats year-round (Osmundson 2003). The three most common small-bodies fishes found in backwaters are fathead minnow, sand shiner, and red shiner, comprising 80 to 100 percent of the fish found in Colorado River backwaters (McAda 2003).

The critical habitat unit within the action area (the Colorado River below Mack Wash to Lake Powell) has been identified in the recovery goals for each of the four endangered fish species (USFWS 2002a, b, c, d) as essential for the conservation of the species. Critical habitat in the action area represents approximately 25 percent of the total critical habitat for Colorado pikeminnow. Colorado pikeminnow is a wide ranging species sometimes migrating extensive distances to carry out life history functions. The action area also encompasses a large area of razorback sucker critical habitat. Natural reproduction of razorback sucker is very rare. Critical habitat for humpback chub and bonytail are limited to shorter reaches of the Colorado River within critical habitat for Colorado pikeminnow and razorback sucker. These shorter reaches include unique habitats required for humpback chub and bonytail that are found in only a few other places in the Colorado River basin.

EFFECTS OF THE ACTION

EFFECTS TO ENDANGERED SPECIES

The subject project would adversely affect Colorado pikeminnow, razorback sucker, bonytail, and humpback chub by reducing the amount of water in the river system upon which they depend by up to 1,372 acre-feet/year. The effects to all four species primarily result from the effects of the action upon their habitats. In general, the proposed action would adversely affect the four listed fish by reducing the amount of water available to them, increasing the likelihood of water quality issues, increasing their vulnerability to predation, and reducing their breeding opportunities by shrinking the amount of breeding habitat within their range.

Removing 1,372 acre-feet/year from the Colorado River Basin would change the natural hydrological regime that creates and maintains important fish habitats, such as spawning habitats, and reduces the frequency and duration of availability of these habitats of the four endangered fish. The reduction of available habitats will directly affect individuals of all four species by decreasing reproductive potential and foraging and sheltering opportunities. Many of the habitats required for breeding become severely diminished when flows are reduced. As a result, individual fish within the action area may not be able to find a place to breed or will deposit eggs in less than optimal habitats more prone to failure or predation. In addition, reduction in flow rates lessens the ability of the river to inundate bottomland, a source of nutrient supply for fish productivity. Water depletions also exacerbate competition and predation by nonnative fishes by altering flow and temperature regimes toward conditions that favor non-natives.

The proposed depletions affect the water quality in the action area by increasing concentrations of heavy metals, selenium, salts, pesticides, and other contaminants. Increases in water depletions will cause associated reductions in assimilative capacity and dilution potential for any contaminants that enter the river. The project depletions would cause a proportionate decrease in dilution, which in turn would cause a proportionate increase in heavy metal, selenium, salts, pesticides, and other contaminant concentrations in the Colorado River to Lake Powell. An increase in contaminant concentrations in the river would likely result in an increase in the bioaccumulation of these contaminants in the food chain which could adversely affect the endangered fishes, particularly the predatory Colorado pikeminnow. Selenium is of particular concern due to its effects on fish reproduction and its tendency to concentrate in low velocity areas that are important habitats for Colorado pikeminnow and razorback suckers.

The proposed project would affect the physical condition of habitat for the four listed fish by resulting in a reduction of water. This reduction would contribute to the cumulative reduction in high spring flows, which are essential for creating and maintaining complex channel geomorphology and suitable spawning substrates, creating and providing access to off-channel habitats, and possibly stimulating Colorado pikeminnow spawning migrations. Adequate summer and winter flows are important for providing a sufficient quantity of preferred habitats for a duration and at a frequency necessary to support all life stages of viable populations of all endangered fishes. To the extent that the proposed project will reduce flows, the ability of the river to provide these functions will be reduced. This reduction of water affects habitat availability and habitat quality.

To the extent that it would reduce flows and contribute to further habitat alteration, the proposed project would contribute to an increase in nonnative fish populations. The modification of flow regimes, water temperatures, sediment levels, and other habitat conditions caused by water depletions has contributed to the establishment of nonnative fishes. Endangered fishes within the action area would experience increased competition and predation as a result.

EFFECTS TO CRITICAL HABITAT

All four of the listed Colorado River fish require the same PCEs essential for their survival. Therefore, we are combining our analysis of all four species into one section. Because the amount of designated critical habitat varies for each of the four species, the amount of habitat will vary; however, the effects would be the same for all critical habitat within the action area.

Water, physical habitat, and the biological environment are the PCEs of critical habitat. This includes a quantity of water of sufficient quality that is delivered to a specific location in accordance with a hydrologic regime that is required for the particular life stage for each species. The physical habitat includes areas of the Colorado River system that are inhabited or potentially habitable for use in spawning and feeding, as a nursery, or serve as corridors between these areas. In addition, oxbows, backwaters, and other areas in the 100-year floodplain, when inundated, provide access to spawning, nursery, feeding, and rearing habitats. Food supply, predation, and competition are important elements of the biological environment.

Primary Constituent Element - Water

The subject action would deplete up to 1,372 acre-feet/year from the Colorado River Basin. Removing water from the river system changes the natural hydrological regime that creates and maintains important fish habitats, such as spawning habitats, and reduces the frequency and duration of availability of these habitats of the four endangered fish. In addition, reduction in flow rates lessens the ability of the river to inundate bottomland, a source of nutrient supply for fish productivity and important nursery habitat for razorback sucker. Water depletions change flow and temperature regimes toward conditions that favor nonnative fish, thus adding to pressures of competition and predation by these nonnative fishes as discussed above.

Changes in water quantity would affect water quality, which is a PCE of critical habitat. Contaminants enter the Colorado River from various point and non-point sources, resulting in increased concentrations of heavy metals, selenium, salts, pesticides, and other contaminants. Increases in water depletions will cause associated reductions in assimilative capacity and dilution potential for any contaminants that enter critical habitat in the Colorado River.

The subject depletions would cause a proportionate decrease in dilution, which in turn would cause a proportionate increase in heavy metal, selenium, salts, pesticides, and other contaminant concentrations in the Colorado River to Lake Powell. An increase in contaminant concentrations in the river would likely result in an increase in the bioaccumulation of these contaminants in the food chain which could adversely affect the endangered fishes, particularly the predatory Colorado pikeminnow. Selenium is of particular concern due to its effects on fish reproduction and its tendency to concentrate in low velocity areas that are important habitats for Colorado pikeminnow and razorback suckers.

Primary Constituent Element - Physical Habitat

The subject action would affect the physical condition of habitat for the four listed fish by resulting in a reduction of water. This reduction would contribute to the cumulative reduction in high spring flows, which are essential for creating and maintaining complex channel geomorphology and suitable spawning substrates, creating and providing access to off-channel habitats, and possibly stimulating Colorado pikeminnow spawning migrations. Adequate summer and winter flows are important for providing a sufficient quantity of preferred habitats for a duration and at a frequency necessary to support all life stages of viable populations of all endangered fishes. To the extent that the subject action will reduce flows, the ability of the river to provide these functions will be reduced. This reduction of water affects habitat availability and habitat quality.

Primary Constituent Element - Biological Environment
To the extent that it would reduce flows and contribute to further habitat alteration, the Project would contribute to an increase in nonnative fish populations. The modification of flow regimes, water temperatures, sediment levels, and other habitat conditions caused by water depletions has contributed to the establishment of nonnative fishes. Endangered fishes within the action area would experience increased competition and predation as a result.

CUMMULATIVE EFFECTS

Cumulative effects include the effects of future State, local, or private actions that are reasonably certain to occur in the action area considered in this biological opinion. Future Federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the ESA. Within the project area in Mesa County on private lands, there are approximately 20 active development applications for residential, commercial, and agricultural development as of mid-2008 (WWE 2008). There are no major highway projects planned in Mesa County within the project area (WWE 2008).

The development of natural gas resources in the general area (Grand Valley) is increasing as industry expands operations from on-going centralized operations that have been focused in the area of Parachute, Colorado. A limited amount of natural gas exploration and development is currently occurring in the project area.

CONCLUSION

After reviewing the current status of the Colorado pikeminnow, humpback chub, bonytail, and razorback sucker, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is the USFWS's biological opinion that the Project, as described in this biological opinion, is not likely to jeopardize the continued existence of endangered fish and the proposed project is not likely to destroy or adversely modify designated critical habitat.

INCIDENTAL TAKE STATEMENT

Section 9 of the ESA and Federal regulation pursuant to section 4(d) of the ESA prohibit the take of endangered and threatened species, respectively, without special exemption. Take is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct. Harm is further defined by the USFWS to include significant habitat modification or degradation that results in death or injury of listed species by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering. Harass is defined by the USFWS as intentional or negligent actions that create the likelihood of injury to listed species to such an extent as to significantly disrupt normal behavior patterns which include, but are not limited to breeding, feeding or sheltering. Incidental take is defined as take that is incidental to, and not the purpose of, carrying out of an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7 (o)(2), taking that is incidental to and not intended as part of the agency action is not considered to be prohibited taking under the ESA provided that such taking is in compliance with the terms and conditions of this Incidental Take Statement.

Colorado pikeminnow, humpback chub, bonytail, and razorback sucker are harmed from the reduction of water in their habitats resulting from the subject action in the following manner-- 1) individuals using habitats diminished by the proposed water depletions could be more susceptible to predation and competition from non-native fish; 2) habitat conditions may be rendered unsuitable for breeding because reduced flows would impact habitat formulation and maintenance as described in the biological opinion.

Estimating the number of individuals of these species that would be taken as a result of water depletions is difficult to quantify for the following reasons--(1) determining whether an individual forwent breeding as a result of water depletions versus natural causes would be extremely difficult to determine; (2) finding a dead or injured listed fish would be difficult, due to the large size of the action area and because carcasses are subject to scavenging; (3) natural fluctuations in river flows and species abundance may mask depletion effects, and (4) effects that reduce fecundity are difficult to quantify. However, we believe the level of take of these species can be monitored by tracking the level of water reduction and adherence to the Recovery Program. Specifically, if the Recovery Program (and relevant RIPRAP measures) is not implemented, or if the current anticipated level of water depletion is exceeded, we fully expect the level of incidental take to increase as well. Therefore, we exempt all take in the form of harm that would occur from the removal of 1,372 acre-feet of water per year. Water depletions above the amount addressed in this biological opinion would exceed the anticipated level of incidental take and are not exempt from the prohibitions of section 9 of the Act.

The implementation of the Recovery Program is intended to minimize impacts of water depletions; therefore, support of Recovery Program activities by the NRCS as described in the proposed action exempts the NRCS and project proponent from the prohibitions of section 9 of the Act. The NRCS is responsible for reporting to the USFWS if the amount of average annual depletion is exceeded.

REINITIATION NOTICE

This concludes formal consultation on the action outlined in the request. As provided in 50 CFR 402.16, reinitiation of formal consultation is required where discretionary Federal agency involvement or control over the action has been retained (or is authorized by law) and if-- 1) the amount or extent of incidental take is exceeded; 2) new information reveals effects of the agency action that may affect listed species or critical habitat in a manner or to an extent not considered in this opinion; 3) the action is subsequently modified in a manner that causes an effect to the listed species or critical habitat not considered in this opinion; or 4) a new species is listed or critical habitat designated that may be affected by the action.

We appreciate your efforts to ensure the conservation of endangered, threatened, and candidate species. If you have questions regarding this letter or your responsibilities under the Act, please contact Tyler Abbott of my office at the letterhead address or phone (307) 772-2374, extension 231.

Sincerely,

For R. Mark Sattelberg
Field Supervisor
Wyoming Field Office

cc: FWS, Fish and Wildlife Biologist, Grand Junction, CO (B. Osmundson)
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WGFD, Statewide Habitat Protection Coordinator, Cheyenne, WY (M. Flanderka)

32

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